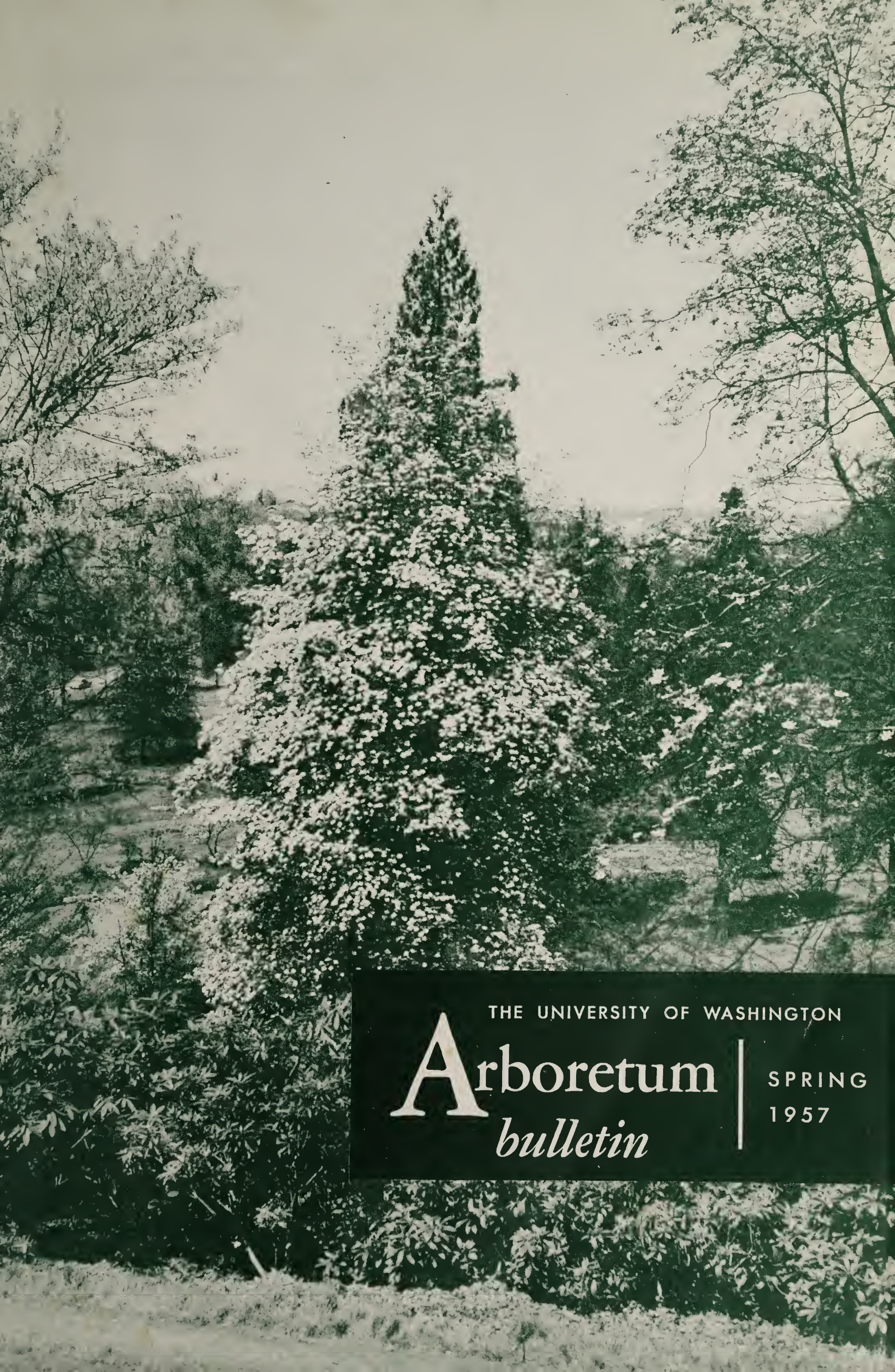

THE UNIVERSITY OF WASHINGTON

Arboretum *bulletin*

SPRING 1957

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Arboretum bulletin

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Cover: *Cornus Nuttallii*
Spring in the Arboretum
—PHOTO BY E. F. MARTEN

Arboretum Report: Fall and Winter, 1956-57

B. O. Mulligan

CONSIDERABLE PROGRESS has been made towards removing evidence of the great damage caused to many of our trees and shrubs by the cold weather of November, 1955. Most of the dead Japanese cherries and azaleas along Azalea Way have been taken out and of the latter a number of the beds replanted.

The collections of crab apples, mountain ashes, brooms, viburnums and others have been pruned and any dead or sickly plants removed. Much dead wood, as well as many low branches and surplus or weak trees, has been cut on Foster's Island, along the Boulevard, and near the lagoon at the northern end of the Arboretum.

Such a tidying-up has been much needed and recently has been more rapidly accomplished by the aid of our small power saw, with the generator mounted on a trailer behind the "Cub" tractor.

The cleared area on the hillside below (west of) the holly collection, divided into two parts by a trail running north and south near its center, was sown with grass over the lower half late in the fall, but only along two diagonal paths across the upper section. The latter has been partially planted with a new collection of *Euonymus* species; the lower half will eventually be planted with species of lilacs (Syringa), some this spring. This will also be accessible from the extreme south end of Azalea Way, to which it is adjacent.

Two entirely new cold frames were built by our own labor on the slope south of the west greenhouse during the fall of 1956, one 40 feet, the other 35 feet in length, both 6 feet wide. They were urgently needed to accommodate the hundreds of seedling rhododendron plants, raised from English and Scottish seeds, to replace some of those killed during the previous winter. To cover them in severe weather we have new tarpaulins given to us by Arboretum Unit No. 33, which proved useful during the cold weather in January.

The adjoining upper lath house has been enclosed, excepting the roof and the east end, by removable panels of plastic sheeting mounted on a wooden frame, each 6 feet high by 10 feet long. This work was completed in December, just before any cold weather was experienced, and will certainly have materially helped to protect the young plants inside. The panels will, of course, be removed when the weather becomes warmer.

Nearly all the sixteen plant beds in this lath house have had their 12-inch-high wooden frames replaced by concrete—a slow task, even with help from the Buildings & Grounds Department of the University—but very necessary on account of their condition, and a noticeable improvement when completed.

Additional parking space, for eight cars, has been prepared behind the service building, east of the clubhouse. We hope to provide another near the magnolia collection by the Upper Road in time for our spring visitors and perhaps to start work on a larger one east of the Boulevard at Interlaken.

A steady supply of stable manure has enabled us to mulch the greater part of Rhododendron Glen, the camellias, Loderi Valley, the newly planted beds on Azalea Way, the Winter Garden, and a portion of the crab apple-rose area with excellent material which should noticeably improve the condition of the plants after another season's growth. Ground limestone was applied to all the grass areas in November last.

Another section of the bank south of the stone cottage near Madison Street has been cleared of a poor lot of shrubs; by April we hope it will have had better soil added and more evergreen trees and crab apples planted to continue the plan already started.

New Plantings

We were fortunate that the weather last fall and early winter was such as to allow almost continuous planting from the end of August to the second week of January, 1957, when snow and frost stopped this work.

Along the Upper Road replacements were made in three collections severely damaged by the weather of November, 1955; *Hebe,* 50 plants of eleven kinds; *Cistus,* 65 plants of eight kinds, and *Escallonia,* 20 plants representing seven kinds. To the Broom collection *(Cytisus)* were added 55 plants of eight of our own selected seedlings, having various flower color combinations, for testing and comparison with others already there.

On Azalea Way, near the north end and the picnic tables, two beds were fully replanted with azaleas, one with Knap Hill hybrids (14 kinds) given by the Seattle Garden Club over a period of several years, the second chiefly with unflowered seedlings of good parentage. Two other beds to the south were partially replanted, using Gable, Glenn Dale and *Kaempferi* hybrids, so that most of the vacant places on the east side as far as Woodland Garden are now filled. We expect to do more here during the spring months, principally by thinning out and rearrangement of crowded plantings, rather than by planting new young stock.

Many of the promising young pines on the steep east bank halfway along Azalea Way were lost in November, 1955. New plants of other and hardier kinds have now taken their places, including species from Jugo-Slavia, the Himalayas and Japan, with five interesting hybrids propagated from seeds or scions received from the Institute of Forest Genetics, Placerville, Calif. On the opposite side of Azalea Way in this area we set out five species of ashes *(Fraxinus),* of which all save one were raised from Japanese or Korean seeds. Some additions to the recent birch plantings at the south end of the pines were also made here, ten plants of seven kinds to strengthen and add variety to this prominent grouping.

An entirely new planting, already briefly mentioned, is that of the spindle berries *(Euonymus)* on the slope west of the holly collection.

This comprises 26 plants, of eleven species, chiefly taken from the old assemblage in the Pinetum, with a few younger plants from the nursery. The site is open to the west and has not been used previously for any other purpose, so that with proper care we can expect good results from these shrubs. Amongst and around them have been placed groups of silver firs *(Abies)* for background and winter interest; immediately to the south is a small new collection of sumacs to provide fall color.

Specimens of two other important tree genera have also lately been transplanted, mountain ashes *(Sorbus)* and Japanese maples. Of the former, 15 more plants representing nine kinds have been added to the new collection across the Upper Road east of the magnolias. Some of these were to replace losses during last winter; others, such as *S. anglica* and *S. scopulina,* are welcome newcomers to the gathering.

The 21 maples are all older plants previously removed from their former site west of the Boulevard for a year in the nursery and now transferred to a safer and, we hope, more permanent site on the higher ground north of Woodland Garden, where they should form a prominent feature in years to come, especially during October, and be easily seen from the Upper Road.

The Arboretum collection is one of the largest in the United States, deserving not only a suitable site and regular care and attention, but also propagation and distribution, especially to other similar institutions; such a program has already been initiated.

In twelve major genera listed the total number of plants set out was 553.

The midget chain saw mentioned earlier, given to us in November, 1955, by the Arboretum Unit Council, has proved its worth during February this year, when the trees along the entire length of the Boulevard were pruned to remove low, overhanging or crossing and dead or dangerous branches; the resulting improvement is now very noticeable to anyone driving through. This saw has a 12-inch cutting bar driven by a 115-volt electric motor, powered by a generator mounted in the trailer which was constructed for this purpose by the University's Buildings and Grounds Department; it may also be used later for carrying a sprayer pump.

The Missouri Botanical Garden Herbarium

John D. Dwyer*

WHEN we read about explorers ascending the snow-studded peaks of the Himalayas or descending to the floor of the dark and voiceless ocean, we are often tricked into forgetting about the serious objectives of most scientific expeditions, so vivid are the word-pictures of the author. If there is a botanist in the expedition, he will be studying the plant life, perhaps picking the snow-clad aconite from a mountain slope, or snatching the gelatinous seaweed from the ocean. These he will carefully press and dry. The author describing the adventure, no doubt, will refer to the hardships involved in the collection and the importance of the plants, but usually he will give little information as to the destiny of the material being gathered.

For an answer to the fate of such materials collected we find ourselves in the Administration Building of the Missouri Botanical Garden. A faint odor of paradichlorobenzene, so commonly used as an insect repellent in clothes closets, may serve as the first clue to the fact that this building is a treasure house of preserved botanical material; in fact it houses one of the largest collections in the United States and, for that matter, one of the largest in the world. In addition, it contains the library and the offices of many staff members and personnel. It is to such places as this in botanical institutions all over the world that most plant specimens, whether collected on mountain, in tropical rain forest, on Arctic tundra, or in a waste-lot in the railroad yards of St. Louis, are ultimately traceable.

If we take the elevator to the second and third floors where the plant collections are stored, the odor of paradichlorobenzene becomes stronger. Yet, no specimens may be in sight! Steel cabinets about 7 feet high, arranged in rows, occupy much of the floor space. Upon opening one of the cabinet doors we are confronted with shelves of manila folders each bearing a scientific name. If we examine a sheet of paper (slightly smaller than a folded newspaper) in the folder marked, for instance, Aconitum (a plant of the Buttercup family commonly called Monkshood), we may find the preserved plant which once flourished in the melting montane snows. On the label in the corner of the sheet will be the details of the collection—the scientific name of the plant, the habitat in which the plant grew, the collector's name, etc.

When the botanist on the alpine slope carefully placed his living specimen between blotters to be pressed and dried, his reasons for collecting it may have been several. Perhaps, as a specialist on the aconites, he sought additional material for study in the preparation of a monograph (descriptions of the species which make up a plant group and their arrangement according to relationships). Perhaps, on the other hand, he wished to furnish the biochemist in distant New Jersey, studying the powerful alkaloids from the roots of the aconite, with the name of the particular species which is so fruitful in its yield of the drug. Perhaps he felt the urge to add another species to the ever-expanding horizon of the biological world.

Wandering through the maze of cabinets we conclude that there must be a great number of specimens in the herbarium (a collection of dried and preserved plant specimens arranged in an orderly fashion for scientific study). In the Missouri Botanical Garden Herbarium there are approximately one and one-half million specimens. These are grouped,

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Note: This article is reprinted by permission of the author and editor from the *Missouri Botanical Garden Bulletin*, XLIV, (8), 120-123, (Oct., 1956).

with other specimens to which they are obviously closely related, into distinct plant families (e.g. the Rose family, the Orchid family) which are filed in the cabinets in systematic order ranging from the simplest to the most complex plant forms. A plant brought into the herbarium for identification is first classified into its family by the use of reference works, then compared with the specimens in that family for determination of its generic and specific name. Success in using this method is, of course, dependent upon the degree to which the herbarium is representative of all plant species.

The early history of the herbarium in Shaw's Garden helps to explain the magnitude of the collections. In examining numerous sheets from various cabinets, for example, we may note the label "Bernhardi Herbarium" stamped thereon. In 1857 Dr. Engelmann, the eminent botanist and first curator of the herbarium, was commissioned by Mr. Shaw to purchase dried specimens from the equally distinguished botanist, Prof. John J. Bernhardi of Erfurt, Germany. Bernhardi had amassed a large herbarium by exchange or by purchase of plants from botanists and collectors active in most areas of the world. In bringing many of the Bernhardi specimens to St. Louis, as well as in purchasing books to establish a library, Dr. Engelmann laid the foundations for the then infant Missouri Botanical Garden as a center of research in systematic botany and related fields.

Dr. Engelmann in his lifetime amassed a private herbarium of over 100,000 specimens. These included important collections made by numerous botanists from 1838 to 1880, principally in many sections of the United States then virtually unknown from a floristic viewpoint. In 1889 Dr. Engelmann's son presented this priceless collection to the herbarium of Shaw's Garden.

Obviously, such a large herbarium demands expert care and constant attention. Dr. George B. Van Schaack, acting curator of the herbarium, in addition to his curatorial duties, must provide for the handling and filing of new accessions of specimens. Special attention must be given to type specimens or plants on which the authors of new species or varieties based their descriptions. These specimens, in special folders identifiable by a conspicuous red edging, are an important source of reference for botanists attempting to interpret the original description and concept of the species. To offset the lack of many type specimens a large collection of photographs of types found in other herbaria is maintained.

The value of an herbarium is to be estimated not only by the numbers of specimens on deposit but also by the use being made of them. Perhaps your first clue to the activity of the Garden in this respect would be the large packages frequently seen at the front entrance of the Administration Building, addressed to herbaria in Europe, England, China or perhaps to a little-known college in Pennsylvania. For dried specimens are sent on loan to scientific institutions throughout the world, including those behind the Iron Curtain. In the herbarium itself, botanists from all parts of the United States, and occasionally from abroad, avail themselves of the opportunity to study the priceless collections. Frequently their visits extend over periods of weeks or months.

In the herbarium and adjacent offices staff members and graduate students from Washington University are at work on problems involving the nomenclature, classification and evolution of plant groups. Dr. Robert Woodson, senior taxonomist, an authority on the Milkweed family, and Dr. Rolla Tryon, associate curator, a specialist on ferns, are among the well-known staff members. Their training of graduate students serves to perpetuate the heritage of a science which is absolutely essential to botanical and scientific progress. Many prominent American taxonomists received their early training at the Missouri Botanical Garden and Washington University.* Through the pages of *The Annals of the Missouri Botanical Garden* and similar journals, as well as by teaching and lecturing, they have

*At St. Louis, Mo.

(Continued on Page 38)

The Herbarium of the University of Washington

C. Leo Hitchcock*

HERBARIA, in general, are of three main types. There are perhaps no more than a dozen such institutions in the world that are as important as that at the Missouri Botanical Garden, several of them being in the United States. These places house most of the type collections of the early plant explorers and each contains a fairly complete representation of the flora of the world.

In contrast, there are probably thousands of privately owned and usually individually collected herbaria in the possession of amateur or professional taxonomists. These collections probably most often start as an "extra credit" project in some course in high school or college biology. Usually they are put away and forgotten by the owner once the course is finished, eventually to reappear as a cherished remembrance in the possession of some grief-stricken relative of the deceased owner and often wind up as an insect-infested gift to some educational institution. Occasionally, however, their owners continue their botanical interests and amass, through their own collecting and through exchange with other collectors, extremely valuable private herbaria. There have been several such notable herbaria assembled in the western United States, including that of Marcus E. Jones and A. O. Garrett of Salt Lake City, those of A. A. Heller, C. F. Baker, I. W. Clokey and S. B. Parish of California; Thomas Howell, L. F. Henderson and W. C. Cusick of Oregon, J. W. Blankinship of Montana, W. C. McCalla of Alberta, J. H. Christ of Idaho, Wm. Suksdorf of Klickitat County, Washington, and J. W. Thompson, Carl and Edith English and W. J. Eyerdam of Seattle. Eventually these private collections usually outgrow the facilities of the owner's home or of his or her spouse's patience and become, through gift or purchase, an acquisition of one of the major herbaria.

Occasionally, however, they go to form the nucleus of the third general type of herbarium, the regional herbarium. Examples of such herbaria would include that of the University of Wyoming (Aven Nelson's collection), that at Willamette University (M. E. Peck's collection), and at Stanford (the W. R. Dudley collection). As the name implies, a regional herbarium is one that has been planned with concentration on the flora of some particular area rather than with the idea of accessioning a world flora. These herbaria are numerous, often excellent, and usually the property of some educational institution.

It is to the third category that the herbarium of the University of Washington belongs. For many years this herbarium was limited in its growth because of lack of space and financial support. It was first stored in the garret of Parrington Hall, then in the basement of the Washington State Museum and finally in Johnson Hall, where, in 1938, it was adequately housed in the third floor wing.

At the time of its transferral to Johnson Hall the herbarium contained about 25,000 specimens, exclusive of the mosses, liverworts, fungi and algae. A campaign of expansion was started in 1938 and for several years the Department of Botany conducted summer field excursions to various parts of the western United States, southwestern Canada and even to Mexico. Primarily, however, collecting was done in the less well known and often not too accessible areas of the northwestern United States. The objective was to assemble a herbarium that would serve as a working collection to be used in the preparation of a flora of Montana, Idaho, Oregon and Washington; therefore field work was concentrated most heavily in those states. Collections were made in large duplicate series; in one summer alone 32,000 sheets of material were collected. The duplicates were used for exchange with

(Continued on Page 38)

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Mature Rocky Mountain Juniper

(Fig. 1) —U. S. FOREST SERVICE PHOTO

Junipers for the Denver (Colorado) Area

ROBERT E. MORE*

JUNIPERS like this area. Consequently, a representative number of species are found in collections here. And since junipers are variable, and hybridize more easily than many evergreens, varieties are legion. *Juniperus scopulorum* is especially variable and every midwestern nurseryman selects his own favorites. Many are, of course, very similar to others—particularly after attaining an age of twenty years. But there are enough distinctive and worthwhile clones of *J. scopulorum, J. virginiana* and *J. horizontalis* to exhaust available planting area in most collections and arboreta. Since there are so many varieties, personal taste enters into any attempt to list "the best." All one can do, therefore, is to indicate the preferences of the individual writer at the moment.

Nomenclature is easier for the plantsman than for the botanist. The latter must be right, but is always in part wrong. The plants-

*We are fortunate in having an article on this subject from Mr. More, who is one of the most knowledgeable amateur conifer growers in the West.

man, however, merely chooses some ranking authority, and all quarrel must be had with such third person. I shall follow Rehder's "Bibliography of Cultivated Trees and Shrubs" (1949). Species will be discussed alphabetically.

Juniperus Ashei (J. mexicana)

Probably not hardy in Denver. It was first tried two years ago and potted grafts in a sheltered location showed little liking for this climate. It should be remarked at the outset that Denver is, by and large, a "rough" climate. The boundary line between Wyman's zones three and four virtually goes through Denver. (See zone map in "Trees for American Gardens" by Donald Wyman.*) Sun rays are intense at Denver's elevation of 5280 feet, only 12 inches of moisture is to be expected annually and winds are almost continual. Finally, wide extremes of temperature occur within the space of a few days. In 1950 the thermometer read 51 degrees F. on November 7 and was minus 8 degrees F. on November 10. As sharp a variation can occur in February or March.

Juniperus chinensis

Our experience with this species, up to ten years ago, was limited to a comparatively few varieties. *Pfitzeriana* — the most frequently used juniper of all — was in every nursery and almost every yard. *Keteleeri,* a splendid upright with huge berries, was available. *Sargenti* was infrequently offered, but eagerly sought by those familiar with it. It is one of our hardiest and most useful low evergreens. The miscalled *excelsa stricta* (See Wyman, supra, p. 200) had been found tender and discarded and the ordinary *J. chinensis* had found little favor because the persistence of its dead needles soon gave it an unkempt appearance. Now the following clones have been added and all seem very worthwhile. Spreaders: Blue Hetz, Golden Pfitzer, *globosa,* Hillbush, Maney. Uprights: Ames, *robusta* (very picturesque, with huge berries, but inclined to cling to old needles), Steel Blue, Wintergreen.

Juniperus communis

Our ubiquitous *J. c. saxatilis* roams from the foothills to timberline. It is so "common"

Below:
Table Top Rocky Mountain Juniper
(Fig. 2)
—PHOTO BY OTTO ROACH

*Published by the Macmillan Co., New York, 1951.

nurserymen have neglected it. This was, perhaps, a mistake. Tough, slow growing, green all winter if kept in the shade, easy to move and not fussy as to soil, it has no equal for mountain planting, and is more and more called for in city plantations.

Other varieties have been tried only recently. *Aurea* is tender. *Stricta (hibernica)* and *suecica* suffer snow injury. Ashford seems to hold some promise and *cracovia* distinct promise. *Kiyoni* is tender. Vase is a splendid, hardy item.

Juniperus conferta

This species suffers great winter injury even when protected.

Juniperus horizontalis

The very useful Creeping Juniper is disliked by nurserymen because it takes up a lot of room in the nursery row, is easily injured by the cultivator, takes considerable time to make a showing in the home planting—and isn't too well known by the trade. Five years from now it will be in every catalogue. Few evergreens can take its place for low foundation planting, rock gardens, transition plants and ground cover on banks. The lowest and slowest growing clones are Blue Wilton, Glenmore and Pulchellus. *Plumosa* and *Douglasi* (Andorra and Waukegan) have spectacular winter color, but don't like exposure to winter sun and wind. Marshall is the best all-around creeper for Colorado. Admirabilis is admirable and Filicinus truly refined—but short lived. *Alpina* is tall and sprawly, but hardy. *Glomerata* and the many California offerings are still on trial in Colorado. Bar Harbor—everybody offers one and all are different!

Juniperus monosperma

Unless grafts that are now being tried of blue juvenile foliage hold constant—as they have for 10 years with *J. scopulorum*—no color varieties of this valuable native will ever be offered. A scouting trip two years ago disclosed one million trees, all the same color when over twenty years old. Some variation in form is found, but usually it is a fat bush. Nurseries collect the single stem plants. This species is virtually pest-free. The bush type

Young Rocky Mountain Juniper
(Fig. 3)
—PHOTO BY ALBERT HAANSTAD

is splendid for hedge planting. Although listed by Rehder as zone 7, it is completely hardy at Glenmore (elevation 7000 feet) where annual minimum temperature is minus 35 to minus 50 degrees—zone 2. *J. monosperma* is one of Colorado's best ornamental evergreens.

Juniperus occidentalis

A variety, Glenmore Blue, is as spectacular as almost any juniper. The foliage and new branchlets are as glaucous as *Salix irrorata*. It was injured in Denver in the November, 1950, drop of temperature, being caught before seasoning, but was uninjured at Glenmore where dormancy came earlier. That February the Glenmore thermometer dropped to minus 50 degrees, yet this tree went serenely on next summer!

Juniperus pachyphlaea

It is still too early to make positive statements about this handsome juniper, but a

(Continued on Page 32)

Know Your Cultivated Junipers

Marion Trufant Hall*

Introduction

THE genus *Juniperus* is the third largest in the Coniferales, and its many species are not only widespread but also extensively cultivated. The name *Juniperus* properly applies to those members of the family *Cupressaceae* with small, usually dark, fleshy, berry-like pistillate cones containing seeds without wings. The staminate and pistillate cones may be borne on the same plant (monoecious) or, more characteristically, on different plants (dioecious) even though the strongly dioecious species occasionally produce monoecious individuals, apparently at random. The junipers may very well be the most plastic of the cone bearing plants. They may be "forced" or trained to take innumerable shapes, many quite grotesque.

I would estimate that the genus probably contains about forty species even though over sixty have been described. Geologically, the more primitive junipers are known from the Upper Cretaceous of New England and Greenland, while the more recent arid lands' junipers are known from the Pliocene and the Pleistocene. The arid lands' types have probably evolved with the development of our modern deserts, apparently during the late Cenozoic. The majority of the species, the appressed scale-leaved ones, are characteristically found in semi-arid or arid regions at mid-altitudes. The most primitive species, *J. drupacea, J. Oxycedrus,* and perhaps *J. foetidissima,* are found in the arid areas of Asia Minor and from Morocco through Spain to the Caucasus. Other species are distributed from the Pamirs to Japan and Korea. In North America, junipers are found widely from Canada and Alaska south through Mexico into Central America. The most widespread species is the circumboreal *J. communis.* The only species extending into the southern hemisphere is the African *J. procera,* which is an important forest tree at median to high altitudes from Ethiopia to northern Tanganyika. In the United States the most widespread species is *J. virginiana,* especially so if *J. scopulorum* and *J. silicicola (barbadensis* of American authors) are considered as subspecies of it.

On each continent most of the species are centered about the Pacific side and are nearly equally divided between Eurasia and America. The present distribution of *Juniperus* fits Buchholz' idea that the Pacific perimeter probably represents the distribution center of the Coniferales during most of their recent period of evolution.

The conservative treatment of the genus calls for three sections: *Caryocedrus, Oxycedrus,* and *Sabina.* The sections show structural series with regard to female cones and leaf types. The transitions are from more woody cones in section *Caryocedrus* to quite fleshy berry-cones in section *Oxycedrus,* and from the acicular-type (awl shaped) leaves to reduced scale type leaves in section *Sabina.*

Synopses of the Sections in Juniperus

Caryocedrus. Microsporangiate strobili clustered 3 to 6 in a head, spreading after anthesis, their axes stipitate; microsporophylls 9 to 12, their connectives ovate acute, incurved at the apex; seeds joined into a thick globose woody 3-angled mass; leaves acicular.

The single species, *J. drupacea,* may represent a relatively unsuccessful attempt at evolution toward a woody-coned arid lands' plant, or it may represent the sole surviving species of a more ancient type of juniper. This species is found in the eastern Mediterranean from the arid mountainsides of southern Turkey, to Syria, Lebanon and the Peloponnesos.

Oxycedrus. Strobili axillary; microsporangiate strobili solitary with stipitate axes, the stipes covered with minute scale-like bracts; microsporophylls decussate; ovules three, alternate with the inner scales of the strobilus, their enlarged stigma-shaped tips persistent on the

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Note: Because of limitations of space a key to distinguish 21 species of *Juniperus,* drawn up by Dr. Hall, has had to be omitted. It is, however, available in the Arboretum files.

fruits; seeds free, usually three, fewer by abortion; leaves ternate, linear, acicular, free and jointed at the base, eglandular, channeled and white-glaucous on the upper surface; buds scaly.

There are nine species commonly listed for section *Oxycedrus* or probably seven by a more conservative treatment. A conservative list includes *J. Oxycedrus* (containing *J. macrocarpa* and *J. Cedrus), J. brevifolia, J. taxifolia, J. formosana, J. rigida, J. conferta* and *J. communis.*

J. Oxycedrus, J. macrocarpa, J. Cedrus and *J. brevifolia* are very closely related with the latter species apparently the most divergent.

J. formosana and *J. taxifolia* are likewise closely related.

J. communis, J. rigida and *J. conferta* form a final close species group in the section.

Sabina. Strobili terminal on dwarf axillary branches; microsporangiate strobili solitary; microsporophylls ternate or opposite; seeds 1-12, free; leaves ternate or opposite, mostly scale-like, closely appressed, crowded and adnate on the branches, glandular or eglandular; leaves on vigorous branches or young plants free and acicular.

The *Sabina* section, the largest of the three, contains about thirty species, judged by quite conservative estimates, even though more than fifty are listed in current taxonomy. These species are about equally divided between the New and the Old World. Most of the New World species are found in the more mesic habitats within and at the edges of the North American deserts. In the Old World most of the species occur in arid areas from the Mediterranean across Asia Minor to Kashmir and the Himalayas. A conservative list of the species in the *Sabina* section would be as follows: New World—*J. bermudiana,*

Below:
Fruit of *Juniperus occidentalis,* from near Bend, Oregon. (About twice natural size.)

(Fig. 4) —PHOTO BY E. F. MARTEN

J. virginiana (including *J. scopulorum, J. silicicola,* as subspecies), *J. lucayana* (including *J. gracilior, J. saxicola), J. horizontalis, J. Ashei, J. californica* (including *J. utahensis), J. monosperma* (including *J. Pinchotii, J. erythrocarpa), J. comitana, J. Gamboana, J. Deppeana, J. Patoniana, J. flaccida, J. jaliscana, J. Blancoi, J. monticola, J. Standleyi, J. durangensis;* Old World—*J. procera, J. squamata* (including *J. recurva),* some fifteen Asiatic one-seeded junipers which probably represent about four species, *J. phoenicea, J. foetidissima, J. chinensis, J. semiglobosa, J. davurica, J. religiosa, J. excelsa* and *J. thurifera.*

With an eye for the complexities of juniper evolution, we should take a look at our cultivated ones. Since we do not know where all of them fit in, we should probably accept a very conservative treatment until the facts are available. On that basis, I present the following notes and keys to the cultivated junipers.

Complications in Classifying Cultivated Junipers

It is not easy to learn the junipers used in horticulture. The first complicating factor is a biological one, namely, that the species, as they are now known within both sections *Oxycedrus* and *Sabina,* hybridize quite freely and often produce extensive hybrid swarms. Secondly, to suit his fancy, man, as horticulturist, has selected every conceivable kind of juniper from the great storehouse of natural variation. These unusual and potentially valuable junipers are propagated vegetatively as clones, and where necessary they are grafted to the root systems of sturdy native stock. Many of these variants are hybrids and sometimes contain genes from three or four "species." Usually, these hybrids are not well adapted to the habitats of the species from which they arose, but they may find the going easy either in areas in an early successional stage or in areas moderately disturbed by man's activities. An extensive hybrid swarm may exist in nature for a very long time, and its diversity may be perpetuated, in part at least, by the propagation of clones and spread throughout the world as cultivated plants. Frequently, these horticultural forms are grown in such quantities that sports are occasionally found, and these are then propagated as cultivars. As the result of esthetic impulse man is able to greatly complicate the variation patterns of those species which interest him. It is safe to say that the taxonomy of the junipers is not adequately known and probably will not be until someone is able to look at our wild species as a whole and then fit the cultivated ones into the pattern realistically. It seems probable that when the taxonomy is worked out there will be fewer named species, more synonyms, more descriptions of the complex variation patterns and analyses of the factors responsible for them.

A review of reproductive behavior will help to point out the nature of the suggested complex variation patterns among junipers. Like many conifers, the juniper habitually produces great numbers of pollen grains and seeds. When the mature pollen is shed in early spring, the plants which bear the staminate cones—containing the pollen sacs—are draped in gold-dust yellow, the color of the millions of pollen grains which are at that time ready to sail like tiny flying saucers and sift into the pollen chambers of the egg-bearing plants.

In most species the berry cones—containing the seeds—are produced, usually each year, on individuals other than those which produce the staminate cones. The abundance of fruit varies considerably from year to year, every third year usually being one of peak productivity. During a year of optimal productivity, a single plant may produce large quantities, tens of thousands, of berry-cones. The number of seeds per berry-cone is usually small. Seed number is relatively constant within a species but between species may vary from one to six. It is obvious that a very large quantity of reproductive material is produced by individual plants, and that in a large population there are as many different potential combinations as there are

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Juniperus communis var. *Jackii* Rehder

B. O. Mulligan

THE Siskiyou Mountains, in southern Oregon and the adjacent parts of northern California, are noted for the unusually large number of plants of all kinds, from trees to herbs, which grow there but seldom elsewhere; such plants are termed endemic to the area.

Examples among woody plants are Brewer's spruce *(Picea Breweriana),* Sadler's Oak *(Quercus Sadleriana),* the prostrate *Ceanothus pumilus,* and charming little *Kalmiopsis Leachiana,* one of the best known in cultivation; dwarf forms of the tanbark oak *(Lithocarpus densiflora)* of the Chinquapin *(Castanopsis chrysophylla)* and the California Laurel *(Umbellularia californica)* are also found.

In late June of 1955 a small party under the guidance of Mrs. Harry O. Smith of Cave Junction, Oregon (authoress of an article on native plants of the Siskiyou Mountains in our Winter, 1952, issue) drove southwest from O'Brien on Highway 199 in extreme southwest Oregon to see what we might of the remarkable native flora.

The first stop was for a sphagnum bog full of the green and yellow Californian pitcher plant *(Darlingtonia californica)* which was duly photographed, and on the bank beyond it, amongst bushes of an *Arctostaphylos,* a very distinct little lily, *(Lilium Bolanderi)* with whorled, glaucous leaves and bell-shaped, reddish flowers. At the second halt, where the road crossed Whisky Creek, *Cypripedium californicum* was found in bloom and made another excellent picture. Here, also, on the rocky slope above the creek, the dwarf tanbark oak was first noticed, at an altitude of about 2,000 feet.

From this point the road climbed and twisted upward, wriggling along close to the Ore-

Below:
Juniperus communis var. *Jackii* on Oregon Mountain, Southwest Oregon

(Fig. 5) —PHOTO BY B. O. MULLIGAN

gon-California borderline. Well up on the mountainside we stopped again, in a fortunate location to examine more closely the low evergreen scrub which we found to be chiefly composed of a dwarf oak *(Quercus vaccinii-folia),* species of manzanita *(Arctostaphylos)* and the tough-looking *Garrya buxifolia* with some of last year's seeds still remaining to be picked. On the bank between this and the road crept two very different but equally unusual and fascinating small shrubs—*Ceanothus pumilus,* and this distinct variety of *Juniperus communis,* named *Jackii* by Alfred Rehder in 1908—almost half a century ago—from material collected by J. G. Jack and himself in this same region.

The Ceanothus, which occurs only on mountains in southwestern Oregon and northwestern California, formed a perfectly prostrate, compact mat some 20 inches wide, on a slope of disintegrating rocks, and bore a few half ripe fruits. Its height was perhaps 1½ inches.

The juniper, on the other hand, as the photograph shows (fig. 5) spread out a number of arms like an octopus from its center, the longest extending 3 feet or more down the slope, the upright branchlets rising 2 to 3 inches; other plants were seen with long branches hanging over the vertical bank beside the road, so that this habit appears constant and principally distinguishes it from the common juniper of the Cascade and Olympic Mountains *(J. communis* var. *saxatilis* Pallas), which grows into large cushion-like mounds without such ropy branches.

Material for the herbarium and for closer photography was collected, as well as fruits and cuttings for attempting propagation. Unfortunately, none of these last has succeeded; evidently neither type was in the right condition at that time so we still lack living plants in the Arboretum. Dried material was later sent to the Arnold Arboretum for confirmation of the name and found to agree very well with the type specimen there.

There are two remarkable facts in considering this mountain shrub, apparently so suitable for planting on banks or rocky slopes.

First, although described nearly fifty years ago and growing in an accessible area it has, so far as we know, never been introduced into our gardens. This is indeed surprising, when one considers the pre-war distribution of *Iris innominata, Iris bracteata* and *Kalmiopsis Leachiana,* to mention three ornamental plants of the Siskiyou region, and the number of knowledgeable plantsmen and women between San Francisco and southern British Columbia. A possible explanation is that this juniper was not generally recognized as a distinct variation from the usual type found in the Northwest. In any case, we hope that this lack may be remedied within the next few years, for the plant would be a useful acquisition.

The second point to be made is that I have only been able to find it mentioned in four reference works, namely Rehder's "Manual of Cultivated Trees and Shrubs" (1927 and 1940), Murray Hornibrook's "Dwarf and Slow-Growing Conifers" (2nd ed., 1938), L. H. Bailey's "Cultivated Conifers in North America" (1933), and L. Beissner's "Handbuch der Nadelholzkunde" (1909). However, the last three are all very brief descriptions, evidently copied from that of Rehder in 1908. Presumably none of the authors, except Rehder, had seen living plants.

It is not included in Peck's "Manual of the Higher Plants of Oregon" (1941), LeRoy Abrams' "Illus. Flora of the Pacific States," Vol. 1 (1940), Ira N. Gabrielson's "Western American Alpines" (1932), Dallimore and Jackson's comprehensive "Handbook of Coniferae," 3rd ed. (1948), or "Conifers in Cultivation," published by the Royal Horticultural Society, London (1932).

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MAY 1, 1957

Junipers of the Mediterranean Area

HENRY R. COCKER*

OF THE thirty-five odd species of Juniperus,† which are so widely distributed throughout the temperate and sub-tropical regions of the world, about a dozen species and varieties are natives of the Mediterranean Region and many of these are first-class plants for the garden. There are also several geographical forms which have southern Europe as their native habitat. Apart from those native to China, Japan and north Africa, the Mediterranean junipers are the only hardy members of the genus outside the borders of North America.

Apart from the interesting point that, like so many conifers, junipers have two types of leaves—juvenile and adult—an even more significant characteristic to the gardener is that they are lime-lovers, as is so frequent with plants which have glaucous or grey-green foliage. As such they are greatly valued as garden plants in districts where the chalky nature of the soil restricts the number of evergreens (including almost all the Erica family) which can be cultivated. On the northern shores of the Mediterranean, which include both the French and Italian Rivieras, there are situated some of southern Europe's most spectacular gardens, and as the majority of these are on calcareous soil, junipers have been widely planted.

The Mediterranean climate is somewhat contradictory and there are indications that it is changing, or at least passing through a particular cycle. Summers are very hot, almost sub-tropical, and winters used to be at least temperate; frost and snow were unheard of, and it is these features which make this zone so justly famous. During recent years, however, there has been a tendency for the winters to become much colder, with snow at such places as Monte Carlo on the north shore, and in Libya and Tripoli on the south shore. Last winter (1956) enormous damage was done to such plants as oranges, lemons, palms, cacti, olives, carnations, etc., especially in inland areas which do not receive the benefit of the higher temperature always found at sea level, near the shore. Immediately the coastal belt is left the land frequently rises very rapidly and considerably higher altitudes are quickly reached, often of a rocky and mountainous character. It is in such surroundings that many of the junipers are to be found, either native or cultivated, some of the most important of which are the following.

Juniperus Oxycedrus Linn. A compact shrub or small tree up to 30 feet high and ten feet in girth. Leaves awl-shaped, in alternate whorls of three, ½ to ¾ in. long, tapering to a point. Upper surface with a narrow green midrib, on each side of which is a white stomatic band. Male and female flowers on different plants. The fruit ripens in the second year; it is solitary, about ½ in. in diameter, shining reddish-brown when ripe. This species is very variable in the wild state and there are several distinct varieties. It is widely distributed throughout the Mediterranean region but is one of the less hardy junipers. The wood is very fragrant and provides an oil known as "oil of cade" which is used for medicinal purposes, especially skin diseases. There are some particularly good specimens in a garden at Antibes.

J. Cedrus Webb & Berth. Few specimens of this species are now to be found in the wild state and these are located in remote places in the Canary Islands. Its leaves are in whorls of threes; they are uniformly awl-shaped, ⅝ inch long, very concave and with two glaucous, stomatic bands above. Fruits are globose, reddish-brown and glaucous when mature. It has the proportions of a tree and reaches a height of 100 feet, with spreading branches and slender, pendent branchlets. The

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†Dr. Hui-Lin Li, in "Morris Arb. Bull.," 7, (4), 50, (Dec. 1956) estimates 60 species.

species is closely allied to *J. Oxycedrus* and may, in fact, be only a geographical variation, but it is less hardy. The scarcity of wild plants is probably due to the value placed on its timber, which is pleasingly perfumed. At one time it was highly prized by the Guanches of Teneriffe for making mummy cases. For a juniper it is quick growing and might be planted with advantage in warm temperate areas. Male and female flowers on different trees.

J. drupacea Lab. A tree reaching a maximum height of 60 feet. Leaves narrow lance-shaped, in whorls of three, ½ to ⅞ inch long, jointed at the base, pointed. Upper surface concave with a broad green midrib and two white stomatic bands. Male and female flowers on different trees. The fruit, which ripens in the second year, is the largest of the genus, often one inch in diameter, brown or bluish. This very distinct juniper is easily recognized from all the other species by its large, stiff leaves with adherent bases and large fruits. It is perfectly hardy and is found at elevations as high as 5,000 feet in the mountains of Asia Minor, Syria and Greece. It is a fine garden plant on account of the beauty and distinctness of its shape.

J. excelsa Bieb. A tree of columnar habit, attaining in its native state a height of up to 100 feet. Cultivated plants in gardens, however, rarely reach half this height. It is a native of the Balkan countries and Asia Minor, but widely used throughout the Mediterranean on account of its timber, which is greatly valued for building purposes, furniture, railway sleepers, etc., as it is of good quality and very durable. Leaves are from ⅛ to ¼ inch long, sharply pointed, in pairs or threes. Male and female flowers on the same or different plants. Fruits globose, one-third of an inch in diameter, dark brown covered with blue bloom. For gardens it is a most elegant tree and is easy to grow. The variety *stricta* is more pyramidal in habit with foliage of a more pronounced glaucous hue, while the var. *Perkinsii* is still more glaucous and is a most beautiful plant for garden purposes.

J. phoenicea Linn. A shrub or small tree from 20 to 40 feet high. Leaves about ¼ inch long, in whorls of three. Male and female flowers on the same tree. Fruit globose, ¼ to ½ inch in diameter, yellowish or reddish-brown. Widely distributed throughout the Mediterranean, growing in dry situations on rocky hills. In Algeria it is often the only arborescent vegetation, ascending to 6,000 feet. It is a plant which attains a very great age and in the Canary Islands there are enormous plants reputed to be 1,000 years old. The timber has some commercial use for building and is sometimes distilled for its fragrant oil.

J. Sabina Linn. A shrub of modest proportions, of a spreading habit, maximum height rarely more than 5 to 10 feet. The entire plant gives off a strong aromatic odor when bruised. Leaves 1/20th inch long. Plants either uni- or bi-sexual. Fruits globose, ¼ inch in diameter, dark brown, covered with a blue bloom. For garden purposes it is one of the most useful and most decorative dwarf evergreens. This species is closely allied to the N. American *J. horizontalis,* although it does not have such a glaucous-blue appearance. The wood and shoots provide "Oil of Savin," which is used in medicine for its powerful diuretic properties. The variety *cupressifolia (humilis),* known in gardens as the "Carpet Juniper," is still dwarfer and rarely exceeds a height of 1½ feet. For use in rock gardens it is of very great value. There is also a variegated form. Another very excellent dwarf garden plant is the variety *tamariscifolia,* which, as its name implies, has foliage like the Tamarix.

J. communis Linn. An interesting point about the common juniper is that it has a wider distribution than any other tree or shrub. It is common through north and central Europe and is also to be found in the mountains of countries bordering on the Mediterranean. It occurs in Asia Minor, the Caucasus, Persia, Afghanistan, the Himalayas, the U. S. A. and Canada. This species forms a

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Ornamental Junipers Used in Southeastern Washington

WILLARD S. SUMMERS*

IN southeastern Washington, where junipers are not native, ornamental junipers are found in cities and villages where men have chosen to plant them. The kinds of junipers are many and varied. The varieties that are found here do not necessarily represent all of those that might grow in this area. The soil and climate seem to be favorable for the health and growth of the following twelve kinds and varieties.

1. *Juniperus chinensis Pfitzeriana*—
   Pfitzer Juniper.

A broad pyramid with horizontally spreading branches. The largest specimen on the W.S.C. campus is approximately five feet high with a spread of twenty feet. The branchlets are nodding and are grayish-green in color. This plant is often misused when planted as a part of a small home base planting or planter. This very vigorous plant needs plenty of space and should be used with discretion. It is best used in border mass plantings and around large houses. Otherwise it will require frequent prunings to keep it in bounds.

2. *Juniperus chinensis pyramidalis*—
   Chinese Juniper.

One rather old specimen on the W.S.C. campus is thirty feet tall, with ascending branches, forming a very compact, narrow pyramid. It has crowded upright twigs. The

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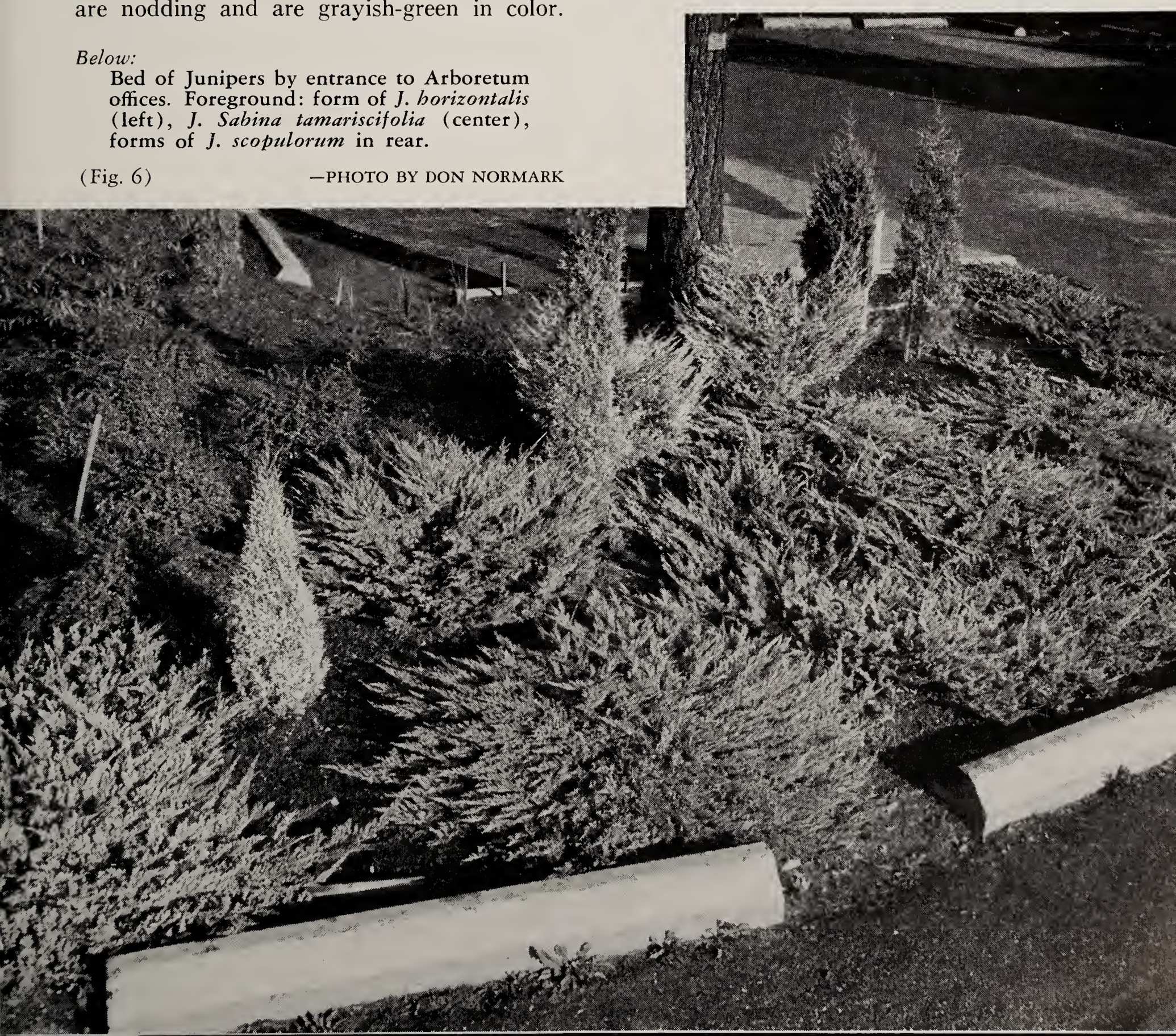
Below:
Bed of Junipers by entrance to Arboretum offices. Foreground: form of *J. horizontalis* (left), *J. Sabina tamariscifolia* (center), forms of *J. scopulorum* in rear.

(Fig. 6) —PHOTO BY DON NORMARK



leaves are in threes, sharp, and bluish-green to grayish-green in color. This rather tall pyramid can be used as an accent plant at the corners, doorways and other architectural breaks in a large building. It responds well to pruning and can be kept low enough to use around the one-story house. It may also be used as a display or specimen plant in the garden where a tall accent is needed. It could be used in hedges and windbreaks.

3. *Juniperus communis depressa*—
   Prostrate Juniper.

Low creeping shrub forming broad patches, with the stems ascending from a prostrate base. The leaves taper from the base to a sharp point with a broad white band above and sometimes divided at the base with a green midrib. The fruit is dark blue and glaucous. This shrub makes an excellent ground cover, particularly on sunny banks. It could also be used near the base of a house and in planters if kept within bounds. It makes an excellent rock plant for rockeries.

4. *Juniperus horizontalis*—
   Creeping Juniper.

Low, trailing juniper that seldom reaches more than twelve inches in height. Spreads, as it grows older, by the branches taking root where they touch the ground. The foliage color is bluish-green or steel-blue, with blue fruits. The creeping juniper is finer in texture and does not grow so tall or erect as the prostrate juniper. It is a good ground cover and looks well in rockeries. It is a good bank cover and does reasonably well planted at the top of a wall and allowed to hang over the surface.

5. *Juniperus horizontalis plumosa*—
   Andorra Juniper.

Very similar to the creeping juniper in habit of growth and use. The major difference is that it turns bronze-purple in the autumn and winter. This evergreen plant makes quite a contrast to the various greens of other evergreens.

6. *Juniperus Sabina*—
   Savin Juniper.

An upright, spreading shrub with trunks or stems that are erect. It reaches a height of about four feet, with a spread of about three feet. The branchlets are rather slender and have a disagreeable odor when bruised. The foliage is dark green. This is one juniper in this area that does not seem to adapt itself to all conditions of soil and exposure. It can be classed in this area as a medium shrub and used to accent the doorways of a house or as a broad connecting mass of foliage between accents. It does well in border masses and could be used in a low hedge.

7. *Juniperus Sabina tamariscifolia*—
   Tamarix Savin Juniper.

This is one of the most desirable shrubs for the area. It is slow growing and apparently adapted to many soil and exposure conditions. It seldom reaches a height of more than eighteen to twenty-four inches and at maturity spreads to about four or five feet. The branches are generally ascending and recurving in a graceful manner. However, some of the branches remain prostrate. The leaves are dark green but in some cases have a bluish-green color. This shrub looks well in planters, can be used in rockeries, as a cover for banks and as a low neutral mass between accents in the base planting of a small home.

8. *Juniperus scopulorum*—
   Western Red Cedar.

Very attractive small tree reaching a height of fifteen to twenty feet and adapted to dry areas. Its spread is around five to six feet. It is native along the banks of streams and rivers at some of the lower elevations. It has a large number of very light-green fruits and foliage that is green to yellowish or light green. This tree can be used effectively as a windbreak and as an accent in a border mass. In hedges it does well if attention is paid to proper training. In some areas it can be used as a tall accent at the corners, doorways and other architectural breaks around the home. If left to grow to full maturity, it should be grown near large one and one-half or two-story houses.

9. *Juniperus squamata Meyeri*—
   Meyer Juniper.

This is an upright, many-branched shrub

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Herbs in the Garden

Margaret E. Watt*

WEBSTER defines an herb as "a plant which does not develop woody persistent tissue, as a tree or shrub, but is more or less soft or succulent," also "grass or herbage." However, in our meaning of herbs in the garden, some trees and shrubs are included, especially low, woody shrubs, as well as annuals which die down in the winter, and perennials.

Herbs, as we think of them, are those which we grow for culinary use, pleasure and scent, and for medicinal purposes. In old English use the word was spelled and pronounced "erb", but in 1800 the pronunciation was changed to "herb"; this was generally accepted and is the correct pronunciation in Britain today. However, "erb" is usual in the United States.

Records from the Chaldean era, 5000 B. C., and the Egyptian and Ching Mong eras, 3000 B. C., and in the time of the Druids in Britain, show that herbs were grown then for medicinal purposes. Roman records show that herbs were grown for culinary and medicinal uses in Britain before the Roman invasion, but after the Christian religion was established the growing of herbs was forbidden for many years by the church because of the superstitions surrounding them. However, the practices persisted and many so-called "witches" were burned at the stake because they practiced the art of healing by the use of herbs.

For some years after this herbs were grown chiefly by monks in the monasteries, medicines from them were dispensed to the people, and so the art of healing was associated with the church.

In later years the apothecary or herbalist was often the main source for obtaining dried herbs and distillations for home remedies. Today many of the medicines are derived from herbs which are grown commercially. Dickens' Old Apothecary still has his counterpart in some places, and a very good old apothecary's shop is to be found at Bethlehem, Pennsylvania, where the brightly colored bottles and fascinating concoctions, which intrigued me in my childhood, are to be seen and bought. The present-day health stores are an outcome of this, only not as interesting artistically, and the pharmacist and chemist the scientific counterparts.

In the 15th century wealthy people and the Court were becoming interested in formal herb gardens, and King Henry VII of England was among the early patrons of the art. The reigns of Henry VIII and Queen Elizabeth, in the 16th century, brought this type of gardening to its height, and many people studied and wrote books on the subject. The Tudor period set the stage for the formal herb gardens as we know them.

The famous Knot Gardens were made in the 16th century, and can still be seen in the palace gardens at Hampton Court and elsewhere in England, while in the United States they have been reproduced in the restored gardens at Williamsburg, Virginia, and in a replica at the Brooklyn Botanic Gardens, Brooklyn, New York. The garden at Brooklyn has been brought up to date, especially with medicinal herbs, and prominent physicians and pharmacists of the country were consulted in order that the garden would be representative of the herbs used by the medical profession. There is also a section devoted to poisonous herbs in this garden, as there is at Montreal Botanical Garden.

Old superstitions regarded definite times for sowing and harvesting according to the moon, to sow on the "full of the moon" and to gather "on the wane." Parsley should never be sown on Good Friday. There was enmity between Rue and Basil, and they would not grow side by side for that reason (the true reason is that Rue likes poor lime soil, while Basil likes good, loamy soil and a soil free from lime). Another superstition was that Elderberry

*Miss Watt, who will be remembered for her fine article on "New Zealand Veronicas" (Summer, 1954), shows another interest in bringing this subject to us.

bushes must be planted close to the garden to protect the plants and man from evil.

At the present time interest in herb gardens has been revived on a more practical basis.

My recollection of herb gardens in England, before World War II, was of a large vegetable garden laid out in straight lines with intersecting paths wide enough to work from. The vegetables were hidden from the paths by low fences on which were trained espaliered fruit trees, with a border about four feet wide in front of this fence next to the path, in which were planted culinary and scented herbs and flowers for cutting. At the edge of the border on one side was planted dwarf box *(Buxus sempervirens suffruticosa),* at the other end Lavender *(Lavendula vera),* and on the side borders Germander *(Teucrium Chamaedrys).*

A modern herb garden should meet the needs of the family. It can be a patch near the kitchen door, or attached to the vegetable garden, or it could be a retreat from the stress of modern living. This will depend on the size of the property, and the means and time at one's disposal. A small herb garden can also be made around a patio, or with low-growing thymes and the like among the paving stones on the patio. The scented creeping thymes are particularly adapted because they are not damaged by walking on them.

If a more formal garden is desired, there should be a definite plan, and the garden should be set slightly apart from the rest of the garden. It can be separated from this by a hedge of roses, sweet-scented shrubs, or a combination of these and some flowering cherries, plums or crab apples.

Paths should intersect the garden wide enough for two people to walk along comfortably. Outer borders in the background might be planted with Sweet Briar *(Rosa rubiginosa), Rosa rugosa,* Austrian Briar *(Rosa lutea),* Musk rose *(Rosa moschata),* or the old-fashioned red roses *(R. gallica)* if obtainable. In the Southern states Lemon Verbena might also be planted. At the corners could be planted the Bay Tree *(Laurus nobilis)* and, if you are superstitious, an Elderberry bush or two. Good kinds are *Sambucus nigra, S. nigra laciniata* which has deeply cut leaves, *S. canadensis,* and *S. racemosa.* All are good for home-made wine.

Along the front edges of the borders lower herbs can be planted, such as *Teucrium Chamaedrys,* dwarf lavender *(Lavendula vera* Munstead variety), Catnip *(Nepeta)* and various upright thymes *(T. vulgaris, T. nitidus),* while a summer display can be made with dwarf nasturtiums, violas, dianthus, dwarf marigolds, mignonette, and dwarf heliotrope, and a spring display of primroses and wallflowers. The primroses should be taken up after blooming and put in a shady spot for the summer.

If a front border is not desired then many low-growing plants can be used. Chives, parsley, pennyroyal *(Mentha pulegium),* Pot marjoram *(Origanum Onites),* dwarf thyme *(Thymus Chamaedrys, T. citriodorus* and its varieties *aureus* and *argenteus), Thymus Serpyllum* and its varieties *albus, coccineus, lanuginosus,* and *minus;* also *Thymus lanicaulis,* a species with gray foliage and a trailing habit.

Towards the center of the border a wide variety can be planted. Those growing two to four feet and requiring plenty of room to grow are such plants as Rue *(Ruta graveolens),* Hyssop *(Hyssopus officinalis),* Horehound *(Marrubium vulgare),* taller lavenders *(Lavendula Stoechas, L. Spica* and *L. vera),* Wormwood *(Artemisia Absinthium),* Southernwood or Old Man *(Artemisia Abrotanum).* There is also an ornamental variety of *Artemisia,* Silver King, which grows about 18 inches high. There are several mints, but these should be confined and planted in the most moist part of the garden. Good ones are Apple mint *(Mentha rotundifolia),* Spearmint *(Mentha spicata),* Golden apple mint *(M. gentilis),* and Peppermint *(Mentha piperita).*

Scented Geraniums can be planted from front to center of this border, and are useful for many purposes. Plant rose-scented geranium *(Pelargonium argenteum),* lemon-scented *(P. crispum),* peppermint-scented *(P. tomentosum),* and spice-scented *(P. limoneum),* to mention a few.

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The Water Birch*

Mrs. Sunnie Lancaster

MANY clumps of the native Water Birch *(Betula fontinalis)* are found growing along Garden Springs Creek of the Finch Arboretum. Several clumps of this birch have been allowed to grow to maturity in Spokane's city parks, also.

Like most birches, the Water Birch seems to prefer moist, loamy soil. It thrives in the mountains at springy places, along creeks, and in moist rocky canyons, where it forms dense thickets and may attain a height of 30 feet. However, this graceful tree braves the watercourses of the arid plains also, although it grows much smaller and often quite shrubby in this area. Because of its preference for springs and mountains, the Water Birch is often referred to by such common names as Spring Birch and Mountain Birch.

As the name implies, it grows in wet places of the Upper Sonoran to Canadian zones of vegetation. Its range is from British Columbia to California and east to South Dakota.

From a distance its most distinguishing characteristic is that it usually grows in clumps and seldom over 30 feet high. It has a delicate appearance with a thinly foliaged crown and graceful, drooping branchlets.

The rich red-brown or copper bark with horizontal lenticels is another distinguishing characteristic. The young twigs are very warty due to a covering of resinous dots which become more shiny with age.

Young leaves are glossy with resinous dots also. The leaves are small, up to 2 inches long, and broadly ovate, being broad at the base and abruptly acute at the apex. The margins are coarsely serrate-dentate and the undersides are lighter green than the upper sides. In the fall the foliage turns a lovely yellow to amber color.

Male catkins are usually found in groups of three. They begin to appear on the tree in late summer and fall, and bloom in the spring when the leaves begin to appear. The flowering male catkins hang pendulously and are 2 to 3 inches long.

The female catkins are solitary, stouter, and shorter than the male. They are about ¾ inch long and very friable after they ripen in midsummer. The Water Birch reproduces readily from seed which is produced in abundance each season.

Planting of Water Birch is not widely practiced as it is not especially desirable due to its wide or shrubby habit of growth. It is supposed to be short-lived. With its split main trunk it often breaks in windstorms as the fine-grained wood splits easily.

Below:

Water Birch
(Betula fontinalis)
(Fig. 7) —PHOTO BY MRS. LANCASTER

*Owing to late arrival and lack of space this interesting account of one of our native birches (by Mrs. Lancaster of the Finch Arboretum) had to be held over from the Winter issue.

Books on Shrubs in the Arboretum Library

(Asterisks (*) indicate books especially recommended.)

Anyone Can Grow Roses, Cynthia Westcott (New York, 1952). The "Plant Doctor's" Rose Book. Growing, choosing, living with and caring for roses.

**American Camellia Yearbook,* edited by American Camellia Society (Gainesville, Fla.) 1946-1955 inclusive. Excellent information on the genus, from history to new hybrids.

**Azalea Handbook,* American Horticultural Society (Washington, D. C., 1952). Authoritative, covering botanical aspect, azaleas for the garden and for regional areas, growth factors, soil and mulches, pests and controls, propagation and hybridizing by the amateur.

**Azaleas, Kinds and Culture,* H. H. Hume (New York, 1948). Azalea botany and distribution, information on evergreen and deciduous species, propagation, soils, culture and care, pests and diseases, many illustrations—nine in color.

British and Foreign Trees and Shrubs in Cornwall, Edgar Thurston (Cambridge University Press, 1930). An interesting approach, giving the climate of the area, the cause of the disappearance of trees, names of trees in place names, parks and gardens in Cornwall. 42 black-and-white plates.

Calluna (a monograph on the Scotch Heather), W. Beijerinck (Amsterdam, 1940). Including botanical structure, life history, geographical distribution, significance for mankind, and a bibliography. 30 plates and 141 figures.

**Camellia, The,* Southern California Camellia Society (Pasadena, Calif., 1947, 1949 (second printing 1950), 1951 and 1954 (best edition)). A check list giving cultural information, nomenclature, very good information on propagation. Invaluable for the serious grower.

Camellia Research, conducted by the Horticultural Research Committee of the Southern California Camellia Society. Authoritative—a symposium of horticultural, physiological and cytological work on the genus Camellia up to 1950.

Camellias and Magnolias (Conference Report), Royal Horticultural Society (London, 1950). One chapter entitled "Some Books on Camellias" is particularly noteworthy. 46 black-and-white and nine colored illustrations.

Camellias and Common Sense, Claude Chidamian (Los Angeles, 1951). Geography, uses in home and garden, species and varieties, culture, propagation, pests and diseases. Photographs and line drawings.

**Camellias in America,* H. H. Hume (Harrisburg, Pa., 1955). A revision of his earlier work (1946). Historical, botanical, cultural and varietal sections. 65 color plates, 107 black-and-white. Authoritative and handsomely produced, but expensive.

Camellias Illustrated, Oregon Camellia Society (Portland, 1948). A rather different approach, giving information on greenhouse culture, packing and shipping of flowers, bud shedding, as well as some history of the genus and varieties.

Camellias in Huntington Gardens, Wm. Hertrich (Pasadena, 1954). Volume I. History, culture, propagation, pathology and pest control, behavior patterns, descriptions of flowers. Many photographs and some color plates. Volume II (1956). Another volume by the curator emeritus of the Huntington Botanical Gardens, giving additional information and observations on culture, behavior and descriptions of cultivars. Here there are more descriptions and plates, with grafting methods, leaf studies and keys. Also a bibliography.

Camellias, Kinds and Culture, H. H. Hume (New York, 1951). Camellia history, geography, botany, classification, varieties, propagation, soils and fertilizing, pruning and training, pot and greenhouse culture, diseases and pests and controls. Line drawings and photographs.

**Ceanothus,* Van Rensselaer and McMinn (Santa Barbara, Calif., 1942). Natural distribution, history, noteworthy collections, as well as descriptions of species and varieties, propagation and cultivation, and a systematic study of the genus with keys. There are also lists of invalid and uncertain names. More

complete information on this genus than in any other publication to date.

**Clematis and Their Cultivation in the Open Air,* Ernest Markham (London and New York, 1951). 3rd Ed. Revised by A. G. L. Hellyer, F.L.S. History, cultivation, propagation, planting Clematis in pots and tubs, as a cut flower, and in America. Descriptive list of species, hybrids, varieties, with 26 plates.

Effective Flowering Shrubs, Michael Haworth-Booth (London, 1951). The reasons for, and the rewards of gardening with flowering shrubs. Some information on culture and propagation, as well. Illustrations in color and in black-and-white.

**Flowering Shrubs of California,* Lester Rowntree (Stanford University Press, 1939). Good reading for anyone who has been to California and reveled in its native plant life. The chaparral, wild lilacs, manzanitas (tall- and low-growing), alpines; plants growing on sunny or shady hillsides, for dry situations, and coastal shrubs. How to bring these into the garden, what they like, and how to propagate them.

Gardening With Shrubs, Mary Lamson (New York, 1946). Reprinted as *Landscape With Shrubs.* An excellent handbook for the amateur. How to plan a shrub garden, giving descriptions and lists of shrubs for particular situations; shrubs without leaves, shrubs with leaves, shrubs in flower, and shrubs in fall color. Where to plant and how to select, grow and study shrubs.

Genus Rosa, Ellen Wilmott (London, 1914). Two volumes. A handsome edition with line drawings and magnificent color plates by Alfred Parsons. It gives the history of the genus, and analytical keys, a very interesting glossary with line drawings, and illustrations of the fruits as well as the flowers.

Glenn Dale Azaleas, B. Y. Morrison (Agricultural Monograph No. 20, U. S. Dept. of Agriculture, Oct. 1953). Informative—giving breeding materials, species and horticultural forms used, outstanding clone material, a descriptive list, and methods of judging plants.

Handbook of Rhododendrons, University of Washington Arboretum Foundation (Seattle, 1946). Distribution, hardiness lists, soils, fertilizers, propagation, pests and diseases, species list, hybrid list, and bibliography.

Hardy Heaths, The, A. T. Johnson (London, 1928). A small book, not new, but interesting to those who want an introduction to heathers.

Hardy Rhododendrons, Frederick Street (London, 1954). The history, development, future of old and new hardy hybrid rhododendrons. Cultural information, classified list of selected varieties. Four color plates and 24 black-and-white.

**Heather Garden, The,* Fred J. Chapple (London, 1952). Probably the best information available on heathers, giving a tremendous amount of information on species, varieties, propagation, plantings, characteristics, and distribution. Illustrated with photographs.

Hedges for Farm and Garden, J. L. Beddall (London, 1950). Relative costs, pests and diseases, and lists of hedging plants for especial situations.

History of the Rose, Roy E. Shepherd (New York, 1954). General history and original sources of most of our garden and species roses, including climbers, Chinese and historic hybrids, French, Austrian, Persian, Scots, and American varieties and hybrids, *rugosa* and its allies, and polyanthas. Bibliography is excellent and the book is well-indexed.

**Hollies,* H. H. Hume (New York, 1953). Almost anything you want to know about the genus—history, legends, folklore, botanical information (line drawings of leaf types), English, American, Chinese, Japanese, evergreen, deciduous, and noteworthy species and varieties. Holly propagation, culture, value and uses, illustrations in color and in black-and-white.

How to Grow Roses, McFarland and Pyle (New York, 1937). Some colored photographs.

Hydrangeas, The, Michael Haworth-Booth (London, 1950). History of the genus, information on the species, breeding, garden varieties, uses as garden shrubs and as cut flowers. Twenty-one plates.

(Continued on Page 41)

The Arboretum Bulletin

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To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and The Bulletin will be discontinued.

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I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

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Notes and Comment

Extracts from a statement supporting the building of a parallel bridge across Lake Washington, given at a public hearing before the Joint House and Senate Highways and Bridges Committee, Olympia, Wash., February 6, 1957.

"The University of Washington Arboretum is recognized as one of the outstanding botanical gardens of the country. With continued growth according to plan, in our favored climate, it will one day be the finest in the United States. Already its fame has spread throughout the civilized world. People from all parts of the state support this arboretum and look to it for information and experience. Forestry and its allied industries are vitally interested in the developments taking place in this living laboratory. While it is primarily a collection of trees and plants arranged in scientific and educational order, it has also great cultural and recreational value. Situated in the middle of Seattle, it is used as a park by residents of state and city. The Greyhound bus line alone carries 75,000 visitors through the Arboretum each year; other thousands come by car.

"It has been inferred that construction according to the latest plans for an Evergreen Point bridge would take very little area from the Arboretum and that additional land would be provided by the necessary dredging. This is incorrect. The planned road itself would take a substantial piece and any land north of the road, newly made or not, would be cut off and entirely useless for Arboretum purposes. Inevitable road connections would make further invasions with the result that years of work and growth would be nullified, recreational area reduced and a halt brought to the great progress your state and university are now making in the scientific and botanical world. . . .

"I repeat, these values are real assets belonging to the people of Washington and these citizens are the ones who stand to lose most by incorrect placing of the second bridge. The fate of the lake, the future of the Arboretum and our neighborhood development, all are dependent upon the right location of the span. To injure any of these assets and

to destroy the more intangible, though real, cultural values is equally as wrong as would be the destruction of any other natural or man-made public resource. Great necessity might condone the ruin of public property, but if the needed improvement can be made without such injury, then any other course seems reprehensible. Sacrifice of the public welfare to benefit the few is in direct violation of our concept of fair play and good government.

"The second bridge can be built parallel to the present structure without any interference with lake, Arboretum or other aesthetic value. Expert, unbiased engineers tell us that such a bridge will best solve the traffic problem. We need this bridge. Let us get on with the job that will be to the best interest of all."

EDWARD B. DUNN

Watch Bill Moshier's "Garden Digest" on KOMO-TV, Channel 4, every Saturday at 5:30 p.m. for news of YOUR ARBORETUM.

WE CALL TO YOUR ATTENTION . . . the very interesting little HANDBOOK ON BROADLEAVED EVERGREENS which was a special printing by the Brooklyn Botanic Garden last autumn. Mr. Brian O. Mulligan, our own Arboretum director, was guest editor and four other Pacific Northwest contributors are among those from ten states and the District of Columbia. Plants suitable for the various climates, conditions and situations from the Pacific to the Atlantic, and from the Canadian border to Mexico, are listed. If you are over-cautious and want no more borderline material, the plants listed as hardy at the Morton Arboretum in Illinois will interest you, but if your memory of the "big freeze" is dimming, you will probably be tempted by some of the southern choices. Of course, there are many fine suggestions for our particular area, also. An interesting propagation unit is shown, as well as information on the optimum method for propagating some of these evergreen ornamentals.

Copies are available in the Arboretum Foundation office. Price $1.00 each.

NEW GARDENER AT ARBORETUM PLANT SALE

It sounds to me almost tyrannical
To tag a plant with this botanical
"Helleborus Niger" label,
When any amateur is able
To recognize by how it grows
That it's the lovely Christmas Rose.

You say these busy connoisseurs
Of plants were once mere amateurs
As I am now, with no terrific
Longing to be scientific?
And you predict there'll come a day
When I'll be erudite as they?

Tut, tut! My love is love of nature
Without regard to nomenclature;
But if I must have erudition
In true botanical tradition:
Forgive me, as my learning grows,
If my heart still says, "Christmas Rose."

LOIS CHRISTY TEWELL

We are proud to bring you THE BULLETIN with a new look this Spring of 1957—and to say that each issue, from now on, will feature a different view or a particularly interesting plant specimen. Our readers who have in the past commented enthusiastically over much of THE BULLETIN's content will, we hope, now express their delight over its exterior as well. We feel we may take pride, too, in quite properly selecting as a highlight for our first picture cover the Pacific Coast's own Dogwood, *Cornus Nuttallii.*

ARBORETUM NOTEBOOK

This section is particularly designed for notes, information and queries concerning beautiful or unusual plants from growers of all types or experience. We solicit your remarks and ideas, but space limitations may sometimes restrict us to publishing those of the widest interest.

Garden Hints

APRIL

The Hellebores prefer to be transplanted in April. Then they proceed with their growing. If they are disturbed at the wrong season they are inclined to sit and become sullen. Divide the clumps carefully with as little injury as possible. The crowns should be covered entirely with good leaf mold and then a generous layer of well-rotted manure.

If you are a clematis lover, how many of the species do you own? Of course, we all know *C. Armandii* and *C. montana* and its variety *rubens,* but have you grown *C. alpina* with lavender drooping flowers that can be used to trail over late blooming, low shrubs in the rock garden without smothering them? *C. macropetala* has flowers of "sapphire blue with a center of narrow, pure white petals." There are many more species to try.

Be an adventurer this year and try a few new plants. Some of the Alliums (onions) are fascinating and lack the heady fragrance of their relatives. By searching the catalogs at the Arboretum many varieties may be found.

Mr. Will Ingwersen, the capable English nurseryman, says, "If I had to choose planting evergreen shrubs or cutting the lawn in April, the lawn would wait another day."

This is the time when we begin our game to watch for the swallows. A few are generally seen in March but the lines of swallows on the telephone wires are seen in April. We always had a small prize to give to the one who saw them first.

MAY

It was Shakespeare who wrote of "the darling buds of May."

Ajuga is becoming a plant of distinction instead of the invasive little weed we have known for so many years. I am speaking of *A. reptans* and remembering the hours I have spent trying to keep it from my rose beds. Now it has found a useful place in many gardens. It has a near relative, *A. pyramidalis,* that can compete with valued plants. It has dark green, crinkled leaves, reaches about nine inches in height and does not spread rapidly.

The brooms and heathers should be pruned after blooming. Pruning makes better shaped plants which will bloom more profusely next spring.

Who isn't looking for an easy plant that will blossom from mid-June until frost? Try Sweet Wivelsfield. These bright and many-colored flowers are a cross between Sweet William *(Dianthus barbatus)* and the hybrid pinks. They grow well in any garden soil that does not lack lime.

Daphne Mezereum is successfully propagated from seeds. Plant the berries in the usual way and watch them grow. Frequently it seeds itself.

The shrubby potentillas are very useful shrubs to vary the contour line of your garden besides being charming in their own right. The group *P. fruticosa* includes some of the best with green or silver leaves and bright strawberry-blossom-like flowers ranging from white to many shades of yellow. *P. Vilmoriniana* has silver leaves and pale yellow blossoms but generally is not a free bloomer. *P. Wardii,* with butter-yellow flowers, is considered very fine. They grow from one to four feet high and need a sunny situation.

JUNE

There are short periods in June when a breathing space seems possible to examine the garden as a whole. Notetaking is valuable and you will be grateful for these notes when you are studying your plan in the winter.

Dry weather is the time to work among the shrubs, forking the soil, removing rhododendron and azalea seeds, cutting off the suckers

from shrubs not grown on their own roots, such as some roses, rhododendrons, viburnums, lilacs, etc. This latter task requires knowledge of your shrubs; suckers should be cut as low as possible, below the ground level, or, better still, pulled out.

When cutting roses for the house we should not hesitate to cut long stems. This will cause new growth that will give a second display in autumn. For this same reason we should not pinch off heads of faded flowers. No new growth comes from this area.

Astilbes are starting their beautiful spectacle in June. They are often confused with spiraeas but astilbes belong to the *Saxifragaceae* family and spiraeas to *Rosaceae*.

An occasional stalk of white digitalis (foxglove) adds great beauty and interest to the June border.

Question: What is a tulip tree?

It is a large, deciduous tree, native to North America. Its Latin name is *Liriodendron tulipifera*. It belongs to the Magnolia family *(Magnoliaceae)* but its June bloom is quite different in coloring, being a rare combination of orange and green.

List of Plant Names

(Continued from Winter 1956)

tectorum	of roofs or houses
tectus	concealed, covered
Telephium	old Greek name
Tellima	anagram of Mitella
tellimoides	Tellima-like
telmateium	from the marshes
Telopea	Gr., seen at a distance
telopeum	conspicuous
temenium	from a sacred place
Templetonia	for J. Templeton, Irish botanist
tenacissimus	most tenacious
tenax	tenacious, firm
tenebrosus	dark or gloomy
tener	soft, tender
tenuicaulis	slender-stemmed
tenuiflorus	slender-flowered
tenuifolius	slender-leaved
tenuilobus	slender-lobed
tenuipetalus	slender-petaled
tenuis	slender, thin
tenuissimus	very slender
tenuistylus	slender-styled
tephropeplum	ashy-gray covering
Tephrosia	Gr., ash-colored
terebinthaceus	resinous
terebinthifolius	terebinthus-leaved
teres	terete, circular in cross section
teretifolius	terete-leaved
tereticornis	with terete horns
terminalis	terminal
ternifolius	leaves in threes
Ternstroemia	for Christopher Ternstroem, Swedish naturalist
terrestris	of the earth
tessellatus	tessellate, checkered
testaceus	light brown, brick-colored
Testudinaria	from testudo, a tortoise
tetracanthus	four-spined
Tetracentron	Gr., four and spur
Tetragonia	Gr., four-angled
tetragonolobus	with four-angled pod
tetramerus	of four members or parts
tetrandrus	with four stamens
tetranthus	four-flowered
Tetrapanax	four and panax
tetraphyllus	four-leaved
tetrapterus	four-winged
tetraquetrus	four-cornered
Tetratheca	Gr., four and cell
teucrioides	teucrium-like
Teucrium	for Teucer, first king of Troy
texanus	of Texas
textilis	woven
Thalia	for Johann Thal, German physician
Thalictrum	ancient Greek name
thalictroides	Thalictrum-like
thapsoides	Thapsus-like, mullein-like
Thayerianum	for a New England family
Thea	Latinized Chinese name of the tea plant

(To Be Continued)

The Coffin Juniper

(Juniperus Coxii)

Mr. E. H. M. Cox visited us recently so it seems appropriate to add the name of *Juniperus Coxii* to the list of Junipers in this number of the BULLETIN. *J. Coxii* grows only in high mountainous regions of the eastern Himalayas and great slabs of its wood, often seven feet long, four feet wide and four inches thick, were carried by Chinese coolies from Burma for the use of coffin makers in China. Mr. Cox accompanied Mr. Farrer on his last voyage of plant exploration in 1919-20 when piles of tremendous planks of a juniper were noted. Upon examination they found a highly scented wood, easy to work and one which is enriched by the lacquer the Chinese use so skillfully. Seeds were sent back to England and as the little trees grew the name *Coxii* seemed a natural title.

The tree is much like *J. recurva*.

G. T. D.

BOOK REVIEWS

Garden Spice and Wild Pot-Herbs, by Walter Conrad Muenscher and Myron Arthur Rice, with illustrations by Elfriede Abbe. Cornell University Press, 1955. Price $5.75.

HERE is a book that is well conceived and well executed, written by an expert in botany for other experts in the field—and for non-experts such as myself and the Smiths down the street. I applauded the performance more particularly in behalf of the Smiths and myself. And without reservation.

It is a compact essay on culinary herbs and edible weeds, such as nettles and field mustard. On its technical side it is precise, authoritative, laconic in statement. The herbalist who has had botanical training will appreciate the descriptions, each done with a certain clinical tidiness, of the various herbs and herb families, and their kettle kin, the pot herbs, or edible weeds. Professor Muenscher has here compiled for the expert such botanical information as is frequently omitted from treatises on herbs, and one feels certain his labor will be appreciated by students.

What gives the essay a special virtue, however, is Professor Muenscher's awareness of the gastronomic implications of his subject. One has the comfortable feeling that his interest in the culinary uses of many of the herbs he describes is more than academic. Such culinary information as he gives for each of the herbs and weeds is general rather than specific—for he is not writing a cookery manual; but on occasion he presents a detailed recipe, as on p. 179, for the use of purslane or on p. 59 for the use of coriander. And there is gusto in the presentation. He also suggests the half dozen or so herbs that one who has limited space should choose for his garden—advice which could only come from one who understands the culinary virtues of herbs.

Since I am in such unqualified agreement with the author that all gardens should shelter a few herbs and that all cooks should explore their culinary uses, I do not hesitate to suggest that this delightful book should be in every kitchen in America. The Smiths will have no difficulty reading the paragraphs in which, for each of the herbs, Professor Muenscher discusses the culinary virtues; and if they learn, also, that certain herbs, in addition to flavoring meats and sauces, are stomachic, antiscorbutic, carminative, antiflatulent and expectorant—why, that is all to the good. They can't reasonably object to that, can they?

ANGELO M. PELLEGRINI

The Ferns and Fern-Allies of British Columbia, by T. M. C. Taylor. 154 pages and 72 full-page illustrations. British Columbia Provincial Museum Handbook No. 12. Victoria, B. C., 1956. Price, 50 cents.

NATURE STUDY packaged in pocketbooks is quick to arouse the suspicion of the professional biologist. So often the little "paperbacks" are long on "oh-my" biology and short on useful information. Not so our present company, a scholarly little (5¼x7¼x¼ inches) work on ferns by a distinguished Canadian botanist. Professor Taylor of the University of British Columbia has teamed up with a first-rate artist, Mrs. Mary Bryant, to give us a very usable field manual for the identification of ferns—a manual equally useful on either side of the border.

Professor Taylor evidently takes the stand that the layman need not be sheltered from the rigors of botanical terminology and Latin names. His path to fern identification is strewn with concise but technical keys as well as diagnostic features that make the possession of a hand lens both imperative and at the same time a source of intriguing discovery. If this path to pteridophyte truth be arduous for some, then the full-page line drawings for each species will ease the traveler's labor. The drawings are more than the quick sketches of many a popularizer of Nature. Each drawing is a technically accurate and remarkably lifelike reproduction of the plant. If all else fails, a quick flip through the pictures will pinpoint the explorer's unknown fern.

The handbook lists about 70 native species of ferns, horsetails and other fern-allies. For each species a diagnosis of its distinguishing characters is given, followed by notes on habitat and range; the comments on abundance, soil preference, and key features are especially informative. Novice and expert alike will appreciate the six-page glossary of botanical terms.

There are eleven handbooks in this Provincial Museum series on topics ranging from edible plants through barnacles to birds. If they are as expertly done as No. 12 on ferns, the Northwest already has a respectable start on the pocketbooker's shelf of nature lore.

A. R. K.

The American Camellia Year Book, 1956. Edited for the American Camellia Society by Arthur C. Brown.

THE 1956 edition of The American Camellia Year Book is dedicated to Thomas Jefferson Smith of McRae, Georgia. This is a well-deserved honor, as Mr. Smith has handled the financial affairs of the Camellia Society since its inception, eleven years ago, when he discussed with Dr. Harold H. Hume and other Camellia enthusiasts the possibility of forming a Camellia Society. How well these gentlemen planned is attested in the eleven fine volumes issued by the Society and the phenomenal growth of its membership.

The first article in this latest edition is a scientific "Review of the Species of Camellia" by Robert Sealy of the Royal Botanic Gardens, Kew, England. It is interesting to find some favorite shrubs, the Gordonias, Stuartias and the Franklinia among those listed as belonging to the *Theaceae*, sometimes known as *Ternstroemiaceae* genus as do the Camellias.

Mr. Ralph Dean, Superintendent of the Gardens of Hong Kong, reports the finding of a distinct new species last year in that area. This is interesting as the flora of that region has been

(Continued on Page 43)

Herbs in the Garden

(Continued from Page 20)

There are many other plants that can be used in such a border, and lists can be found in books which will meet the needs of the individual. A good book on the subject is by Rosetta Clarkson, "Herbs, Their Culture and Use." Other books have been written by Mrs. Helen Fox, Helen Noyes Webster, Maude Grieve, and Eleanor Sinclair Rohde.

The position of the herb garden is important for best results and obtaining the finest oils and scents, and the soil is another influential factor. The best situation is a sunny spot facing southeast or south, with no shade from trees or buildings for the greater part of the day. The soil should not be rich; a sandy soil is best, with the addition of a little compost or leaf mold, but no manure. Lime can be added where the plants require it—alkaline soil is generally best for most herbs—but the most important thing is to keep the soil from becoming too rich.

Herbs can be propagated by seed, or cuttings, and some by division, as for example Mint. Many herbs grow easily from seed, which should be sown in a mixture of one part loam, one part leaf mold, and two parts sand, either in a cold frame or in pots in a cool greenhouse in April or May, with the exception of Lavender, which is best sown in fall in the cold frame, as it germinates better if sown as soon as possible after it is ripe. It can, however, be sown in February or early March in the greenhouse.

Many herbs also grow easily from cuttings, taken in April or May, and inserted in sand in a cold frame, and also in fall if protected over winter. Tarragon must be propagated by cuttings or division in spring, as it does not set seed. Annual herbs are best sown directly where they are to be grown.

Curing, Drying and Preserving of Herbs

Herbs should be gathered when the dew is off them, and during sunshine if possible. Lay out the herbs to dry on open slats, where the air will circulate freely. An open barn is a good place, where the sun does not enter, as herbs dried in the sun lose their scent and much of their flavor. They can also be tied in small bundles and hung up to dry in the shade, but dried as quickly as possible, as this also helps to retain the scent and oils.

Lavender, Rosemary, Thyme and other herbs can be preserved in bottles which are tightly corked; if the bottle is placed in sunshine for a few days after being corked, it will help to increase the pungence; they can then be stored away.

Potpourris made of red Rose Petals, Lavender flowers—which should be gathered before the flowers are fully opened—leaves of lemon Verbena, scented Geraniums, Thyme, and a very little Rosemary, with some orris powder, can be kept for some time in a closed jar, which may be opened occasionally for fragrance.

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Ornamental Junipers Used in Southeastern Washington

(Continued from Page 18)

with short, straight branchlets. Its leaves are grayish or bluish-green with two grayish bands on the upper surface. The fruit changes from reddish-brown to purplish-black. Very handsome because of its dense habit and bluish-white color. This shrub is extremely variable and is more upright than spreading. It is used as a special accent near the front door or in places where its color contrasts with red brick. It may be trained to grow on walls or fences.

10. *Juniperus virginiana*—
Red Cedar.

This small tree is variable in its habit, being either upright or spreading. It has been the source of many selected horticultural varieties. There is much confusion in distinguishing between these varieties, especially when grown under abnormal conditions. Most of those found in this area are upright, reaching a height of fifteen to twenty feet and a spread of five or six feet. It responds well to pruning and will form a narrow pyramid or column-like tree. The twigs are slender and the bark is reddish-brown. Leaves are medium green and the fruit is brownish- violet. This plant does well as a tall accent, windbreak or hedge, though not so good an accent as the Canaert red cedar and other horticultural varieties.

11. *Juniperus virginiana Canaertii*—
Canaert Red Cedar.

This variety of the red cedar is less regular and more graceful than the typical form. It forms a pyramid that is very compact and

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dark green and has an abundance of bluish fruits. It is sometimes confused with variety *glauca* which is a loose pyramid with silvery gray leaves. This plant may be used as a hedge or wind break but is probably more valuable as a striking tall accent at the corners and architectural breaks of a home or as a display accent plant in the garden.

12. *Juniperus virginiana filifera.*

This variety of the red cedar is a broad pyramid with slender, thread-like twigs with leaves that are blue-gray. It should be used in hedges, windbreaks and for tall accents around the home.

These varieties do well in this area in all degrees of exposure except perpetual shade. However, they do best in full sun with good drainage. Naturally, the above limited list does not exhaust the possibilities. Undoubtedly many other species and varieties would do well here. For some reason people in this area have not grown or experimented with them. There is need for testing junipers. Until then, no doubt the above will be the most popular.

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Chinensis pfitzeriana aurea
Communis depressa aurea-spicata
Horizontalis Douglasi
Procumbens
Procumbens variegata
Sabina
Sabina tamariscifolia
Virginiana Kosteri
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Junipers for the Denver [Colorado] Area

(Continued from Page 9)

Colorado Springs nursery has been growing them successfully for 10 years.

Juniperus Pinchotii

Barely stays alive; not hardy.

Juniperus procumbens

The species has not been satisfactory. The variety *nana* is a valuable and handsome dwarf plant, even though it is somewhat difficult to establish and often suffers minor winter injury, even when established.

Juniperus rigida

This handsome and graceful evergreen is thoroughly hardy in Denver, but somewhat difficult to move.

Juniperus Sabina

The species is, of course, completely hardy everywhere in Colorado. Its varieties, especially the D. Hill Russian Savins, and the Spanish *tamariscifolia,* are much superior esthetically to the species. Russian No. 1 (Buffalo) and Russian No. 4 (Broadmoor) are intermediate in size between *J. horizontalis* and *J. Sabina tamariscifolia.* They are hardy in zone 2. Russian No. 3 (Arcadia) is faster growing, but still smaller than the species. *Tamariscifolia* almost never blights in Denver's dry climate, makes a perfectly symmetrical round mound 5 feet high and 12 feet in spread at maturity and is second only in popularity to *J. chinensis Pfitzeriana.*

Juniperus utahensis

This species is difficult to tell from *J. monosperma.* At maturity, it is monoecious and this furnishes a distinguishing characteristic. It more often has a single stem than *monosperma* and juvenile foliage stays blue longer. Grafts are being attempted from juvenile branches. The clone Glenmore is quite slender and symmetrical. The species is being used more and more in Denver landscaping. It, too, is hardy at Glenmore.

Juniperus scopulorum

Ranging from a spreader 5 feet high (or possibly as low as 2 feet) to erect trees 50 feet high and with countless variations of

color, form and texture, this species is the joy of the midwestern nurseryman. The McCoy Creeper and Carl White's Silver King stay under two feet in height and spread to perhaps 10 feet—in an almost perfect circle. They definitely are not pure *J. horizontalis* and since each was found in the zone where *J. scopulorum* and *J. horizontalis* meet, one wonders if they are natural hybrids. (See Norman C. Fassett, *Bulletin of Torrey Botanical Club,* vol. 72, no. 1, Jan., 1945.) Whatever their botanical group, each is hardy and valuable horticulturally.

Spreading clones of fine color are the pistillate Tabletop and Communis type (a confusing name for a *scopulorum* form) and the staminate Park.

In the uprights many clones are generally accepted as outstanding. In the blue and silver shades Gray Gleam, Moffet, Pathfinder, Silver Beauty, Platinum and Marshall always please. Greenmont is a splendid round topped green. Sutherland is a fine green. Cologreen is good. Madora, Sneed and Dewdrop have both juvenile and adult foliage on the same tree and are very attractive. Hall Sport was a graft from a branch of juvenile foliage and the result is a truly amazing, slow-growing, sharply-pointed, completely-acicular tree.

Juniperus squamata

The species is tender in Denver. Variety *Meyeri* is hardy and picturesque, though it gets ragged in maturity.

Juniperus virginiana

This species is completely hardy in Denver and 90 per cent not hardy at Glenmore! This characteristic is so pronounced that it can be employed as a reliable test of species, in doubtful cases. The Platte River type will survive at Glenmore, thus proclaiming its *J. scopulorum* genes. (Fassett, *Bull. Torrey Bot. Club,* vol. 71, no. 5, Sept., 1944.)

The Maine clone Bluecoast is a fine spreader; it also suggests hybridization. (Fassett, loc. cit., vol. 72, no. 4, July, 1945), Green Spreader is a valuable spreader, too. *Kosteri*—except for its very brittle branches—is so like the Pfitzer one wonders if it is not *chinensis* rather than *virginiana*. It is a good spreader. *Globosa* attains about the same height as the spreaders do, but is a fine natural globe.

The hardiest upright clones are De Forest Green and *Hillii* (Hill's Dundee). Both are handsome. *Canaertii* is very popular. Its many berries are most decorative. *Schottii* is very like it, but a brighter green. *Glauca* grows irregularly but has a fine color. Cypress is sometimes tender even in Denver, but has outstanding winter color. Nevin's Blue is splendid.

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Junipers of the Mediterranean Area

(Continued from Page 16)

small tree rarely more than 30 feet high. The bark is reddish-brown, peeling off in paper-like sheets. Leaves are awl-shaped, 2/5 to 3/5 of an inch long. Male and female flowers generally on separate trees. The fruits ripen in the second or third year and when ripe are bluish-black, 1/3 of an inch in diameter. In general, the wood is too small for building purposes, although it is sometimes used for fences, etc. The fruits are used for flavoring gin and an oil distilled from the unripe fruits is used for medicinal purposes. The berries are also said to be used, together with beech-wood, in the smoking of Westphalian hams, the peculiar piquant taste of the hams being attributed to the juniper-berry smoke. This juniper is more often a large shrub of spreading habit rather than a tree and as such is generally used in gardens. Its varieties in particular are some of the most satisfactory and pleasing of evergreens, especially the following: var. *hemisphaerica,* a rare dwarf globose variety found wild on Mount Etna and elsewhere in Italy, and var. *nana* (syn. *alpina),* a dwarf, alpine form growing to less than one foot in height with a stunted habit, short branches and small fruits.* Like so many other special varieties and forms of juniper, however, this dwarfness is not constant and is due merely to climatic conditions; it is said to revert to ordinary *J. communis* under more favorable conditions. Var. *compressa,* a slender, cone-shaped shrub of minute dimensions with branches so dense as to form a rigid mass. This most valuable garden plant is the daintiest of conifers and probably the slowest growing of them all. It is extremely effective in formal arrangements.

J. thurifera Linn. Common in the mountains of Spain, but, although introduced into cultivation as long ago as 1752, still rare in gardens. A tree 30 to 40 feet high in the wild state, narrowly pyramidal in cultivation. Leaves of two sorts, awl-shaped and scale-like. Fruits 1/4 inch in diameter, dark blue, covered with glaucous blue bloom. The trees are unisexual. The wood is used for incense but is not generally known in commerce.

*This is var. *saxatilis* Pallas (1788). Ed.

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Know Your Cultivated Junipers

(Continued from Page 12)

grains of sand on the ocean floor. In a given population there are approximately equal numbers of pollen-bearing and egg-bearing plants, distributed more or less at random. For a particular egg-bearing plant there may be several pollen-bearing plants at approximately equal distances away. When the pollen is shed, the chances are good that many of the eggs of the egg-bearing plant will be fertilized by pollen from these adjacent trees. However, the eggs do not mature simultaneously but rather over a period of a few days, and some eggs may be fertilized by pollen from plants on an adjacent hillside. Whenever the wind movements are favorable, pollen may be blown from great distances to effect fertilization. Pollen from junipers may be carried several hundred miles. Thus, we see that these junipers possess a great potential variability. This large field of variability is an important contributing factor to the success of these species in disturbed and changing environments.

There are many areas where tremendously variable populations of junipers exist. Where are some of these particularly plastic plants to be found?

Some of the most beautiful junipers in the world are to be found in the broad belt of land known as the Great Plains Province, the region of high prairies or steppes east of the Rocky Mountains. These relatively small, graceful plants are found from the Wichita Mountains of Oklahoma to the Palo Duro Canyon of the Texas Panhandle, and farther north from the Black Hills to the foothills of the Rocky Mountains.

There is an amazing number of variations in the junipers within this area of high winds, hot, dry summers and hard winters, and the variations are greater here than in adjacent regions. Why is this so?

These junipers represent the result of the mixing or interbreeding of two and possibly three species. This two- and three-way hybridizing went on in the distant past, probably in late Pleistocene, when the fluctuations of the flora in response to glaciation and deglaciation evidently caused these species to overlap in distribution. As a consequence of these recombinations of genes, the variability of junipers in this region was greatly increased.

In the Wichita Mountain Wildlife Refuge in southwestern Oklahoma, the species commonly called Virginia juniper or red-cedar,

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J. virginiana, more properly appears to be the result of an ancient mixing of three species. The wild populations and one plantation made by the U. S. Forest Service show evidence that there are present genes of Rocky Mountain juniper, *J. scopulorum,* and of Ashe's juniper or Ozark white-cedar, *J. Ashei.* This mixture produces specimens that are unusual and interesting in color of foliage, thickness of branches, and habit of growth. Many valuable junipers could be selected and bred from the populations on this interesting island of granite in the southwestern Oklahoma prairies.

Farther west in the Palo Duro Canyon of the Texas Panhandle there are mixtures of red-cedar, Rocky Mountain juniper and Pinchot's juniper, *J. Pinchoti,* included by some authors with *J. monosperma.* In the northern part of the Great Plains there are a great many hybrids of red-cedar, *J. virginiana,* and Rocky Mountain juniper, *J. scopulorum*—some of rare beauty. The Platte River country and the Dakota Badlands are a rich source of these variants. One horticulturist, D. Hill of the D. Hill Nursery Company at Dundee, Illinois, was able to find many very valuable types for landscaping purposes by breeding and selecting from these plants of mixed lineage. These organisms of great diversity are often of exceptional value to man. He may select for beauty or utility an almost limitless variety; or he may discover, through controlled breeding, new varieties which otherwise might have remained forever only a potential reality.

The historical or geological factors affecting the evolution of junipers, the reproductive behavior, and the forces affecting the distribution of the species relative one to another have produced the complex variation patterns already mentioned. It is no wonder that the classification and phylogeny of junipers is in such a confused and difficult state. It is to be expected. The most aberrant individuals, frequently selected from hybrid swarms, are the ones most appealing to man for cultivation. Before marketing the selected clones, someone names them. These names refer to clones which taken singly may have little significance in the evolution of juniper species, but when considered in terms of over-all variation may be extremely significant. It is not at all surprising that many or most of these clones are difficult to relate to the wild types of junipers. Only when the variation patterns of all the junipers are known will it be possible to associate these clones with the right species.

Nature is the greatest experimenter. Throughout the areas where junipers grow, she has been for countless years a plant hybridizer producing horticultural stock, which man has but to select for his use. From nature's laboratory many plants have come which, like the junipers, are rich in variability and many find a wide range of habitats in which to live. These are the strand plants, the transition zone plants, the ecological waifs and weeds whose plastic natures render them almost ubiquitous.

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The Herbarium of the University of Washington

(Continued from Page 6)

other institutions, particularly those whose collectors were working in the same or adjacent areas, the largest sets going to Washington State College, Utah State College and the University of Wyoming. One specimen, or sheet of specimens of each collection only was incorporated into this herbarium.

Besides the material returned in exchange, several important gifts have been received in recent years, by far the most important being the private herbarium, some 27,000 numbers, of Mr. J. W. Thompson of Seattle, assistant curator of the University Herbarium. Largely as the result of exchange, the herbarium now contains good representative sets of such collectors as Aven Nelson (Wyoming and Yellowstone National Park), L. F. Henderson and J. B. Leiberg (Idaho), W. C. Cusick and Thomas Howell (Oregon), and C. V. Piper and Wm. Cusick (Washington), besides excellent representation of the collections of such well-known contemporary northwestern collectors as Bassett Maguire, A. Cronquist, G. N. Jones, M. E. Peck, Marion Ownby and W. J. Eyerdam.

At the present time the collection includes approximately 230,000 specimens, consisting of about 50,000 Bryophytes (Liverworts and mosses), all collected or obtained through exchange by Dr. T. C. Frye, perhaps 2,000 Thallophytes (Algae and Fungi), and 175,000 ferns and seed-bearing plants. The herbarium is to be found in Room 345, Johnson Hall, and is open for the use of the public from 8 until 5 each week day.

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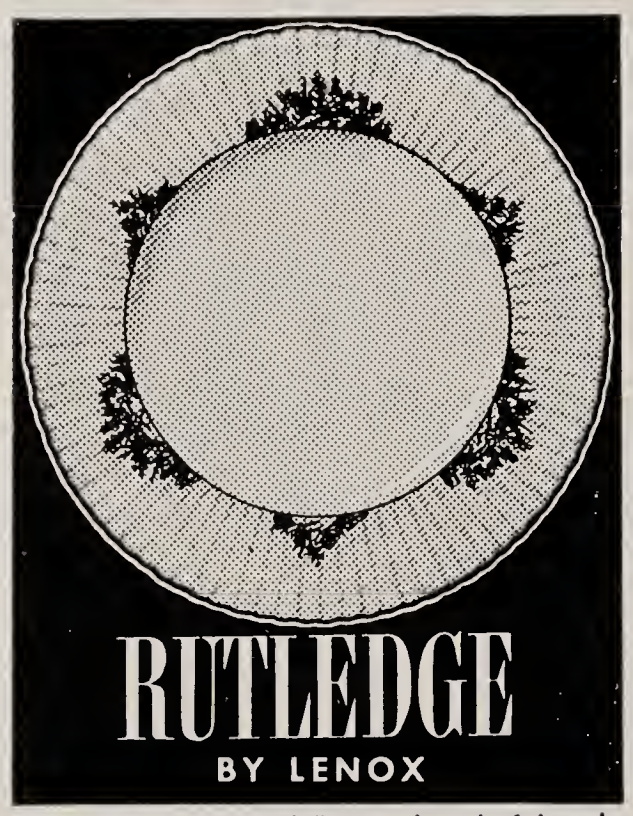

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The Missouri Botanical Garden Herbarium

(Continued from Page 5)

advanced the knowledge of plant systematics. There is scarcely a university or botanical garden that has not felt the impact of the botanical work of Shaw's Garden.

Of great importance to the herbarium is the large collection of living species maintained at Shaw's Garden and at Gray Summit. A student, armed with the knowledge of the morphology of a species gained from a study of herbarium material, is in far better position to appreciate the dynamics of development as well as the range of variability of plants in the living state. Some features important to identification of the species are often difficult to study or are not retained by the dried

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material and are thus best observed in the living plant. Then, too, in the modern concept of the plant species, in which it is interpreted and defined in terms of a community of living and interbreeding plants, greater emphasis is being placed on the detailed study of many living plants from a large experimental population rather than of dried specimens collected at random.

This newer approach to the definition of the species in no sense lessens the value of the herbarium, for it represents the historical record of the world population of plants and the student of the plant community will continue to add specimens to it as evidence of the observations made in the field or in the experimental garden. The herbarium, in serving all of the plant sciences, plays an integral role in the progress of science inasmuch as the problems of botany are a segment of the maze of problems in science today. Not only is it the tool of the taxonomist in solving the intricate problems of nomenclature, classification and evolution of plants, but it also serves other botanists, horticulturists and gardeners who must fall back upon the taxonomist and his herbarium for the specific names of plants. In the vast scheme of scientific advancement, the herbarium plays an important part, even though its role may not be fully appreciated.

If we pause for a moment before leaving the herbarium, perhaps we can sense the drama hidden in the neat piles of herbarium sheets. While lifeless and usually drab in comparison with the living, these plants represent the labors of countless workers and collectors for more than 200 years. It is difficult to imagine that one specimen may have been collected in the shadow of an Indian tomahawk, or another snatched by a quivering hand from a rock precipice in the Andes, or another from the icy rocks of Greenland. It was the enthusiasm of such workers that filled these cases.

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Books on Shrubs in the Arboretum Library

(Continued from Page 23)

Illustrated Manual of California Shrubs, Howard McMinn (University of California, 1951). Authoritative work on the shrubs of that state, showing shrub areas, keys to families and genera, descriptions, cone-bearing shrubs and their allies, flowering shrubs, glossary and bibliography, nomenclatural changes. Copiously illustrated with line drawings and photographs.

Modern Rhododendrons, E. H. M. and Peter Cox (London-New York, 1956). Dr. J. M. Cowan, in the foreword, says this is a comprehensive survey of those rhododendrons deemed worthy for the modern garden, selected by experienced growers and described by connoisseurs. There is one chapter on hybrids but the emphasis is on the best forms of the best of the species. Four color plates and 21 line drawings.

Modern Roses III, J. H. McFarland (Harrisburg, Pennsylvania, 1947). Descriptive list of all roses in commerce or of historical or botanical importance, prepared in cooperation with the American Rose Society. The species are described by Rehder.

Monograph of Azalea, A. (Rhododendron Sub-genus *Anthodendron).* E. H. Wilson and Alfred Rehder (Cambridge, Massachusetts, 1921). Azaleas of the Old World and of North America, their distribution, and the enumeration of the species; also a listing of doubtful names. The names of the authors are all that is needed to recommend this book.

Monograph of the Genus Camellia, The Abbe Berlese (Boston, 1838). Translated by H. A. S. Dearborn. A reprint by E. A. McIlhenny of a classical work on this genus. Culture, description and classification, with two synoptical tables.

New Iconography of the Camellias, Verschaffelt, 1848-1860. Translated from the French by E. H. McIlhenny (Avery Island, Louisiana, 1945). A classic, giving the origin of many of our finest camellias.

Old Camellia Varieties, compiled by A. I. Ellis for the Royal Horticultural Society (London, 1953). Compiled from original sources in the Lindley Library of the Royal Horticultural Society and the British Museum.

**Old Shrub Roses, The,* Graham Stuart Thomas (London, 1955). With chapters on the Evolution of Our Garden Roses by Dr. C. C. Hurst. Development and cultivation of the genus. Old roses in cultivation today, bibliography. 9 color plates, 16 black-and-white.

**Ornamental American Shrubs,* R. Van Dersal (Oxford University Press, 1942). The case for native shrubs; where they can be grown, how to grow them, best shrubs in various sections of the country, maps of plant growth regions of the U. S. This is one of the most valuable on native plant material.

Ornamental Shrubs and Woody Vines of the Pacific Coast, Graham and McMinn (Berkeley, 1941). Keys to the genera, descriptive account of the shrubs and vines, also a section on flowering plant organs. Black-and-white and colored photographs.

Ornamental Trees and Shrubs, R. H. S. Conference, 1938, edited by F. J. Chittenden (London, 1940). Another of the Royal Horticultural Society's very fine publications. Reports by outstanding professional and amateur horticulturists. 80 black - and - white photographs.

**Rhododendrons—1956,* American Rhododendron Society (Portland, 1956). Growing, propagating and breeding rhododendrons, with lists of varieties, ratings, and those named in America. Also A. R. S. Code of Nomenclature, System of Awards and cumulative index of previous A. R. S. publications.

Rhododendrons, F. Kingdon-Ward (London, 1949). Tree, shrub, dwarf, greenhouse and hybrid rhododendrons. A small book, by a man who has collected many of these species in their native homes.

Rhododendrons and Azaleas, Clement Bowers (New York, 1936). Distributional maps, horticultural information, propagation from seed, vegetative propagation, notes on the series and natural species, on the hybrid races and clones, inflorescence charts, flower form outlines, keys, bibliography. Pen drawings by the author, colored illustrations by Franck

Taylor Bowers. A general look at the genus, excellent for the nontechnical grower.

Rhododendrons and the Various Hybrids (First Series), J. G. Millais (London, 1917). General distribution of species, Chinese rhododendrons, hybrids, culture, rhododendrons for every month, classification of the genus. Excellent line drawings, many photographs, 17 in color, 14 collotype plates. This is a classic in rhododendron literature.

Rhododendron Yearbook, American Rhododendron Society, 1945, 1946, 1947, 1948, 1949. Informative reports by professionals and amateurs.

**Rhododendron Yearbook,* Royal Horticultural Society, 1946-1953 (London). *Rhododendron and Camellia Yearbook,* 1954-1956. These yearly publications bring rhododendron enthusiasts the last word on their favorite genus. Some series of the genus have been reviewed by Cowan and Davidian since 1947.

Rosarum Monographia, John Lindley (London, 1830). Or a Botanical History of Roses. A "new edition" with garden varieties systematically arranged. 19 hand-colored plates.

Roses of the World in Color, J. H. McFarland (Boston and New York, 1936). Much more extensive than Mr. McFarland's *How to Grow Roses.* History of roses, how to choose roses, and page after page of beautiful colored photographs.

Roses in Color and Cultivation, T. C. Mansfield (printed in London, published in New York, no date). Roses of the past which influenced modern roses, roses for specific purposes, varieties, culture, propagation, pruning; glossary of roses, descriptions, hardiness, size, flowering period and purpose.

**Shrubs and Vines for American Gardens,* Donald Wyman (New York, 1949). Excellent hardiness zone maps, order of bloom (by the calendar), ornamental fruits, foliage colors, recommended plants, vines, bamboos, naming of horticultural varieties, secondary plant list. Black-and-white illustrations.

Shrubs for the Milder Counties, W. Arnold-Forster (London, 1948). Wind and shelter, planting for roadsides and towns, general planting list. Illustrations, photographs.

Shrubs of Michigan, Cecil Billington (Bloomfield Hills, Mich., 1943). Ecological factors, distributions, rare or infrequent species, form and structure of shrubs, key to the genera, glossary, bibliography, distributional maps. Excellent line drawings.

Species of Rhododendrons, 2nd edition, Rhododendron Society of Great Britain (London, 1930). The rhododendrons are arranged in their series with keys to subseries and to the species, some line drawings. The authority on the genus.

Synopsis of the Genus Lonicera, Alfred Rehder. From the 14th Annual Report of the Missouri Botanical Garden, 1903. Standard monograph on this genus. Old but still authoritative.

Trees and Shrubs, C. S. Sargent (Boston and New York, 1902). Two volumes—a series of plates with detailed descriptions. Illustrated from original drawings by C. E. Faxon. Authoritative.

Trees and Shrubs for Landscape Effects, M. C. Coffin (New York, 1940). Covering plant material hardy along the Eastern Seaboard from Massachusetts to Delaware. Includes backgrounds and ground covers, woodland, green and other gardens, planting fundamentals. Black-and-white photographs.

**Trees and Shrubs for Pacific Northwest Gardens,* John and Carol Grant (Seattle, 1943). What to grow and how to grow them. The authority on this subject for our particular area.

**Trees and Shrubs Hardy in the British Isles,* W. J. Bean (London, 1914, revised 1950). Three volumes of excellent descriptions of shrubs, their needs, cultivation, propagation. Very comprehensive and usable.

Winter-Hardy Azaleas and Rhododendrons, Clement Bowers (Boston, 1954). The genus and its range, types and uses, soil, site and planting, species, hardy hybrid groups and clones. Some photographs. Regional, for Eastern growers.

Yuccas of the Southwestern United States, Susan Delano McKelvey (Arnold Arboretum, 1938). Standard work on the genus. Two volumes. Subdivisions of genus, key to the

species. 125 beautiful photographs.

We have listed only those books in the English language. There are many foreign publications on shrubs in the Arboretum Library.

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(Continued from Page 28)

examined by a succession of botanists and explorers since 1841.

Following are several articles describing new seedlings from *C. Sasanqua* and *C. Japonica*, with several charming ilustrations. The description and evaluation of many of these new seedlings creates the hope that many may soon be accessible to the public.

Ralph Peer, a well-known traveler and Camellia grower of Los Angeles, gives us an account of Belgium's Royal Collection and lists the many varieties growing there. He says, "Today this Royal Collection is seemingly the largest and best-preserved to be found under glass any place in the world." Over three hundred varieties are listed.

A short article on Camellia flower blight in Georgia and the control measures used is valuable should such infestation occur here.

Many interesting articles follow, including such subjects as "A Discussion of Cold Resistance," "Care of Outdoor Camellias in Northern Latitudes"; "The Use of Fungicides in Grafting" is discussed by two professors of bacteriology and plant pathology of Louisiana State University. Also two other articles on grafting, on "Mist Grafting Camellias" and "A Lesson on How to Be a Grafter."

A reprint of circular 891 from the U. S. Department of Agriculture is of special interest to gardeners of the Pacific Northwest, "The Use of Sawdust for Mulches and Soil Improvement." The fertilization of Camellias is adequately handled by Mr. E. P. Courtney of Shreveport, La.

Several charming gardens of the Southland featuring Camellias are described and illustrated.

The volume has many fine black and white illustrations and eight beautiful color prints. Two articles on show judging and show management should prove helpful to any society putting on a Camellia Show.

Flower arrangement of Camellias is illustrated by many lovely examples.

Many other interesting articles are included in this eleventh volume issued by The American Camellia Society.

The volume ends with a gay and facetious skit by Mr. Sam P. Harn of Gainesville, Fla., regarding not a chain letter, but a chain of Camellia scions. To fully appreciate this last "bit" it should be read.

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